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COMPENDIUM OF ARMS CONTROL VERIFICATION PROPOSALS

Third Edition

VOLUME

1

**Introduction
Chapters A - C**



MAY 1987



External Affairs
Canada

Affaires extérieures
Canada

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COMPENDIUM OF ARMS CONTROL VERIFICATION PROPOSALS

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**Introduction
Chapters A - C**



MAY 1987

ABSTRACT

This three volume work is intended to serve as a quick reference catalogue to over 690 arms control verification proposals originating in the publications and statements of governments and intergovernmental bodies as well as the academic literature on the subject.

Each proposal has been abstracted and classified according to two main criteria: the arms control objectives with which it is concerned and the types of verification methods involved. Included are a Subject Index and an Author Index which permit easy access by the reader to any proposal abstract in which he or she may be interested.

Chapters in the Compendium are organized according to methods of verification. Each chapter includes an introductory discussion of the method followed by the proposal abstracts which deal prominently with that verification method. A general introduction to the work is also provided.

RESUME

Le présent répertoire en trois volumes est un index permettant de retrouver facilement et rapidement plus de 690 propositions concernant la vérification de la limitation des armements, tirées des publications et des comptes rendus des gouvernements et organismes intergouvernementaux ainsi que des documents didactiques sur le sujet.

Chacune de ces propositions a été condensée et classée en fonction de deux critères principaux : les objectifs de la limitation des armements et les modes de contrôle en cause. Le lecteur pourra, au moyen de l'index général et de l'index d'auteurs retrouver facilement tous les condensés de propositions qui l'intéressent.

Les chapitres du volume sont distribués suivant les méthodes de contrôle. Chacun d'eux comprend une analyse préliminaire de la méthode, suivie des condensés des propositions qui s'y rapportent tout particulièrement. Le lecteur trouvera également une introduction générale à cet ouvrage.

PREFACE

Most of the research work for the original edition of the Compendium was carried out during the summer of 1977 and was substantially revised during the summer of 1978. In June 1980 an amended version was published as a Canadian contribution to the Committee on Disarmament in Geneva.¹ After further extensive revision and updating, a second edition was completed in the summer of 1981. The second edition was also tabled as a Canadian contribution to the Committee on Disarmament.² The majority of the work for this third edition of the Compendium was completed in the fall of 1986.

The work on the first and second editions was conducted under the auspices of the Operational Research and Analysis Establishment of the Canadian Department of National Defence for the purpose of facilitating basic Canadian analytical research in disarmament and arms control affairs. The third edition of the Compendium was compiled and edited by the Verification Research Unit of the Department of External Affairs.

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1. CD/99, 12 June 1980.
 2. CD/275, 7 April 1982.

PREFACE

La plupart des travaux de recherche pour le Répertoire original ont été exécutés pendant l'été de 1977 et les données recueillies ont été révisées en profondeur pendant l'été de 1978. En juin 1980, une version modifiée a été publiée à titre de contribution canadienne au Comité du désarmement à Genève.¹ Après une autre série de modifications et de mises à jour importantes, la deuxième édition a été terminée à l'été de 1981. La deuxième édition a été aussi présentée à titre de contribution canadienne au Comité du désarmement.² Cette troisième édition, aboutissement de beaucoup de travail, a été terminée à l'automne de 1986.

Les travaux nécessaires à la première et à la deuxième éditions ont été menés sous les auspices du Centre d'analyse et de recherche opérationnelle du ministère canadien de la Défense nationale en vue de faciliter la recherche analytique fondamentale effectuée au Canada dans le domaine de désarmement et du contrôle des armements. La troisième édition du Répertoire a été compilée et mise au point par l'Unité de recherche sur la vérification du ministère des Affaires extérieures.

1. CD/99, le 12 juin 1980.

2. CD/255, le 7 avril 1982.

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INTRODUCTION

The Importance of Verification

An arms control agreement is essentially an agreement between states to undertake restrictive measures with regard to their military forces, which are expected to result in decreased likelihood of war. Since the benefit to each assenting state arises from the compliance of the other signatories there is a natural desire for some form of external assurance that these signatories are fulfilling their obligations. In simple terms verification is the means by which such assurance is gained.

All recent major bilateral arms control agreements between the USA and USSR -- Anti-Ballistic Missile (ABM), Strategic Arms Limitations Agreements (SALT I and II), Threshold Test Ban (TTBT) and Peaceful Nuclear Explosions (PNET) -- have included verification provisions. This attests to the importance accorded to verification by both countries.

The importance of verification has also been widely recognized in multilateral fora. The Final Document of the UN Special Session on Disarmament (UNSSOD I, 1978) states that:

Disarmament and arms limitation agreements should provide for adequate measures of verification satisfactory to all parties concerned in order to create the necessary confidence and ensure that they are being observed by all parties.¹

In this regard, a resolution entitled "Verification in all its aspects" was recently adopted in the UN General Assembly without a vote. Recalling the Final Document of the first special session devoted to disarmament, the resolution affirms the belief that:

Verification techniques should be developed as an objective means of determining compliance with agreements, and appropriately taken into account in the course of disarmament negotiations.²

In any protracted arms control negotiation different verification proposals are likely to be made by different participants, and successful negotiation may well depend on an acceptable compromise

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1. United General Assembly. Special Session of the General Assembly on Disarmament. Final Document. 1 July 1978, para. 31. (See abstract A2.1(I78)).
 2. United Nations. General Assembly. Resolution 40/152(O), 16 December 1985. (See abstract A19.2(I85)).

being reached between these proposals. This appears to be the case for virtually all kinds of prospective arms control topics from general and complete disarmament to control of specific weapon types or limited geographic areas.

It is therefore to be expected that, in the post-war years, during which arms control negotiations have been almost continuously in progress, large numbers of verification proposals have been put forward from many sources. Many have been made by governments in connection with arms control topics that are still under discussion, if not active negotiation; others have been put together by interested analysts and published in the open literature. Even those proposals which are several years old may remain highly relevant to current conditions.

Purpose

This work is designed with three objectives in mind. The primary aim is to survey as many verification proposals as possible using the records of official bodies and academic literature, with the view to creating a quick reference catalogue which would incorporate summaries of the proposals. The organization of the Compendium mainly reflects this objective.

Two other aims are also envisaged. One is to provide as complete an historical survey as is feasible. The other is to provide a document which could be used as an introduction for those new to the field, to enable them to acquire a basic grasp of the topic.

With these aims in mind the coverage of the Third Edition of the Compendium has been expanded somewhat over that of the Second Edition. Theoretical discussions and statements of principles relating to verification and compliance are now included.

This Third Edition supercedes the two earlier editions of the Compendium published respectively in 1980 and 1982.³

Scope

Both governmental and non-governmental verification proposals are included in the Compendium. An attempt has been made to incorporate all major, unclassified proposals made by governmental representatives in

3. CD/99, 12 June 1980; also published as: Alan Crawford, et al., Compendium of Arms Control Verification Proposals (Ottawa: Operational Research and Analysis Establishment, Department of National Defence, June 1980), ORAE Report No. R73. CD/275, 7 April 1982; also published as: Alan Crawford, et al., Compendium of Arms Control Verification Proposals, Second Edition, (Ottawa: Operational Research and Analysis Establishment, Department of National Defence, March 1982), ORAE Report No. R81.

the Conference on Disarmament 1984-1986 (CD), the Committee on Disarmament, 1979-1983 (CD), the Conference of the Committee on Disarmament, 1969-1978 (CCD), and the Eighteen Nation Disarmament Committee, 1962-1969 (ENDC). In addition, arms control treaties and agreements possessing verification provisions have been included. There is no guarantee, however, that all government proposals and agreements have been abstracted.

The review of non-governmental proposals includes those by academics as well as by international bodies and covers the period from 1962 to December 1985, though most attention has been given to the last decade. There has been less comprehensive coverage of 1986. A Supplementary Bibliography of items not received in time for inclusion in the Compendium can be found at the end of Volume 3 of the Compendium. Coverage includes periodical articles, pamphlets, documents and books.

A verification proposal is defined as a statement or document advocating, supporting, rejecting, describing or evaluating a verification system. Only proposals considered to be significantly substantive are abstracted separately. Statements which support or reject a prior proposal are usually appended to the abstract of that proposal. General statements on the need or lack of need for verification are, for the most part, not incorporated into the Compendium. However, theoretical discussions and statements of principles relating to verification and compliance are included in this Third Edition. It should be emphasized also that within these limits the Compendium is not intended to include everything said by every country or author on the subject of verification. Readers who are interested in a more exhaustive listing of government verbatim statements on the subject of verification made in the Conference on Disarmament and its predecessors are referred to the following publication:

Compendium of Verbatim Statements on Verification.
Ottawa: Department of External Affairs, 1985. (3 volumes).

Verification proposals relating to the confidence-building measures are generally excluded from the Third Edition of this Compendium. Readers interested in this subject are referred to the following publication:

Compendium of Confidence-Building Proposals, Second Edition.
Ottawa: Operational Research and Analysis Establishment,
Department of National Defence, forthcoming.

Format of the Abstracts

The abstract of each verification proposal is divided into separate sections as follows:

- (1) Arms Control Problem: The arms control topic or objective to which the proposal is related.
- (2) Verification Type: The verification types involved, that is the kind of inspection, observation equipment, monitoring agency or procedures for verifying a signatory's compliance with the proposed arms control agreement. In the case of theoretical

discussions of verification the designation "Verification - general" is used.

- (3) Source: The source document for the proposal and any related documents.
- (4) Summary: A summary of the verification proposal itself, giving a fair representation of the salient points of the verification mechanism proposed.
- (5) Selected Comments of States: In some abstracts, selected comments on the proposal by participating states have been added.

Arrangement

The basic aim of preparing this three volume Compendium is to provide access to written information on the subject of arms control verification rather than to pass judgement on the efficacy of the various proposals. However, in view of the large number of proposals it has been necessary to organize the abstracts for easy access. This process has unavoidably involved some degree of subjective decision by the authors, but they have endeavored to keep this to a minimum.

There are various ways in which the summaries could be arranged. However, since verification is the topic of the Compendium, it is this basis which has been chosen. The proposal abstracts are, therefore, distributed into 17 chapters; sixteen of these deal with a particular verification method and contain the proposals which are considered to have adopted that method as the most prominent instrument of verification. The seventeenth chapter (Chapter A) includes abstracts which do not refer to a specific method of verification usually because they look at the subject on a general, theoretical level. After the first chapter, the chapters are arranged beginning with the most intrusive verification methods and moving to less intrusive methods.

Within each chapter, abstracts are arranged sequentially, according to the arms control problem/objective with which they deal, in increasing order of specificity (from "Any Arms Control Agreement" to "Conventional Weapons").⁴ Proposals with the same arms control problem/objective are sub-divided in alphabetical order by the first listed sub-division (if any); for example, "Nuclear weapons - ballistic missiles" is followed by "Nuclear weapons - cruise missiles", etc. Proposals with the same arms control topic sub-division are arranged in chronological order beginning with the earliest. Proposals with the same topic subdivision and date are arranged in alphabetical order by source.

4. See the section below entitled "Classification of Arms Control Objectives" for a listing of these topics.

Each chapter begins with a brief introduction describing in general the significant features of the verification method concerned.

- Chapter A deals with general discussions of verification.
- Chapters B deal with verification by direct on-site inspection of
to F facilities: Chapter B general or comprehensive inspection, Chapter C selective or partial inspection, Chapter D IAEA safeguards, Chapter E progressive inspection (i.e. increasing as confidence develops), and Chapter F with control posts.
- Chapter G deals with verification by examination of records.
- Chapter H describes proposals which utilize interviewing techniques and proposals for verification by exploiting each individual citizen's conscience to report on possible violations by their own government.
- Chapters I deal with verification by direct observation, the various
to K instruments used for that purpose and their limitations. Chapter I deals with short-range sensors, Chapter J with remote sensors, and Chapter K with seismic sensors.
- Chapters L deal with verification by evaluating information either from
& M published documents (Chapter L) or from freely exchanged international status reports (Chapter M).
- Chapter N covers proposals for verification by national self-supervision or self-inspection.
- Chapters O deal with the mechanisms for ensuring that suspected viola-
to Q tions are given international consideration. Chapter O deals with complaints procedures, Chapter P with international control organizations, and Chapter Q with review conferences.

Classification of Arms Control Objectives

It is probable that many of the potential users of the Compendium will be concerned with the negotiation of a specific arms control agreement, for example control of the production of chemical weapons. To assist such users a two way classification has been introduced. In addition to the classification by verification method exemplified by the division into chapters, a classification by arms control objective has been made. Examination of the set of proposals indicates seven main arms control objectives or topics, to which has been added a category "Any Arms Control Agreement" for cases where the verification method is seen to have general applicability. Some of these categories have been subdivided to provide greater specificity. The eight main topics or objectives with their major subdivisions are as follows:

- (1) Any Arms Control Agreement
- (2) General and Complete Disarmament
- (3) Regional Arms Control
- (4) Arms Control through Control of Military Expenditures
- (5) Control of Nuclear Weapons
 - (a) Warhead technology
 - (i) comprehensive test ban
 - (ii) fissionable material "cutoff"
 - (iii) partial test ban
 - (iv) peaceful nuclear explosions
 - (v) peaceful nuclear explosions
 - (vi) research and development
 - (b) Delivery systems technology
 - (i) anti-ballistic missile systems
 - (ii) ballistic missiles
 - (iii) cruise missiles
 - (iv) manned aircraft
 - (v) missile tests
 - (vi) mobile ballistic missiles
 - (vii) reentry vehicles
- (6) Control of Chemical and Biological Weapons
 - (a) Binary agents
 - (b) Destruction of facilities and/or stocks
 - (c) Production
 - (d) Research and development
 - (e) Stockpiling
 - (f) Use
- (7) Restrictions on Other Weapons of Mass Destruction
 - (a) Environmental Modification
 - (b) Radiological Weapons
- (8) Control of Conventional Weapons
 - (a) Aircraft
 - (b) Ground forces
 - (c) Ships

Indexes

Subject access to the proposals is possible through the Subject Index at the end of the third volume of the Compendium. This index provides access both by verification type and by arms control objective. The index also includes synonyms and other cross-references between words and phrases.

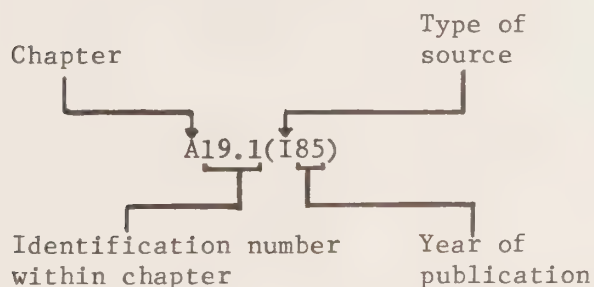
In addition, an index has been provided to the authors of the proposals. This Author Index covers personal authors, corporate bodies, governments and intergovernment organizations. It also serves as a bibliography to the contents of the Compendium. Finally, a list of working papers by ENDC, CCD and DC document numbers has been included.

Reference Numbers

It is possible to glean additional information from the reference numbers apart from the location in the Compendium of the abstract to which they refer. The chapter is indicated by the first letter outside the brackets which thus identifies the most prominent type of verification method involved in the proposal. The digits which immediately follow the first letter indicate the position of the abstract in the chapter. Note that the abstracts are arranged decimally; hence abstract A20.59 would come between abstracts A20.5 and A20.6.

The letter appearing within the brackets identifies the type of source: A for an academic source (usually an individual); G for a governmental source; I for an intergovernmental body; and T to indicate an actual arms control agreement. Finally, the two digits which appear within the brackets following the type of source refer to the year in which the proposal was made.

Key to Proposal Abstract Numbers



Source Codes:

A = Academic
G = Government
I = Intergovernmental body
T = Treaty

Chapter Codes:

A Verification, General
B General On-site Inspection
C Selective On-site Inspection
D IAEA Safeguards
E Progressive/Zonal On-site Inspection
F Control Posts
G Records Monitoring
H Non-Physical/Psychological Inspection
I Short-range Sensors
J Remote Sensors
K Seismic Sensors
L Literature Survey
M International Exchange of Information
N National Self-supervision
O Complaints Procedure
P International Control Organization
Q Review Conference

Comments

Comments on the contents of the Compendium or its format are welcome. Suggestions for inclusions into future editions are particularly appreciated. Please forward such comments to the following address:

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INTRODUCTION

L'importance de la vérification

Un accord sur la limitation des armements est essentiellement un arrangement dans le cadre duquel des pays s'engagent les uns vis-à-vis des autres à prendre des mesures visant à limiter leurs forces militaires en vue de diminuer les risques de déclenchement d'une guerre. Comme les bienfaits d'un tel accord pour chaque pays signataire dépendent du respect des dispositions dudit accord par les autres pays signataires, il est normal qu'on veuille s'assurer par des moyens extérieurs que chaque pays respecte ses obligations. En termes simples, disons que la vérification est le moyen grâce auquel on peut obtenir cette assurance.

Tous les récents accords bilatéraux importants sur la limitation des armements conclus entre les Etats-Unis et l'Union soviétique, à savoir l'accord sur les missiles anti-balistiques (ABM), les pourparlers sur la limitation des armements stratégiques (SALT I et II), le traité sur la limitation des essais souterrains d'armes nucléaires (TTBT) et, enfin, l'accord sur les explosions nucléaires pacifiques (PNET), comprenaient des dispositions relatives à la vérification. Cela témoigne de l'importance accordée à la vérification par les deux pays.

L'importance de la vérification a aussi été largement reconnue lors de conférences multilatérales. Le document final de la Session extraordinaire des Nations Unies consacrée au désarmement (UNSSOD I, 1978) stipule que :

Les accords de désarmement et de limitation des armements doivent prévoir des mesures de vérification suffisantes qui soient satisfaisantes pour toutes les parties concernées afin de susciter la confiance nécessaire et de faire en sorte que les accords soient respectés par toutes les parties.¹ (Traduction)

A cet égard, une résolution concernant tous les aspects de la vérification a été adoptée récemment à l'Assemblée générale des Nations Unies sans qu'il soit nécessaire d'avoir recours au scrutin. La résolution rappelle le document final de la première session extraordinaire consacrée au désarmement et affirme la conviction que :

1. Assemblée générale des Nations Unies. Session extraordinaire de l'Assemblée générale consacrée au désarmement. Document final. Le 1^{er} juillet 1978, par. 31. (Voir résumé A2.1(I78)).

L'on doit mettre au point des techniques de vérification en tant que moyens objectifs de vérifier le respect des accords et en tenir dûment compte au cours des négociations sur le désarmement.²
(Traduction)

Tout exercice prolongé de négociation visant un accord de limitation des armements peut donner lieu à diverses propositions de vérification venant de différents participants, et le succès des négociations peut alors fort bien dépendre de la volonté des participants d'en arriver à un compromis. C'est ce qui semble se passer pour pratiquement tous les objets possibles de limitation des armements, du désarmement général et complet jusqu'au contrôle de certains types d'armes ou de zones restreintes.

Il était donc normal que l'on voit mettre de l'avant dans les années d'après-guerre, années au cours desquelles les négociations visant la limitation des armements n'ont presque jamais cessé de progresser, un nombre considérable de propositions de vérification émanant de nombreuses sources. Nombre de ces propositions, faites par des gouvernements, portaient sur des sujets qui font encore l'objet de discussions, si ce n'est de sérieuses négociations; d'autres ont été réunies par des analystes s'intéressant à la question et elles ont été publiées dans des documents connaissant une diffusion libre. Même les propositions qui remontent à plusieurs années peuvent encore revêtir un immense intérêt dans les conditions actuelles.

But

Le présent ouvrage s'inspire de trois objectifs, dont le principal consiste à examiner soigneusement le plus grand nombre possible de propositions de vérification tirées de comptes rendus d'organismes officiels et d'ouvrages didactiques sur le sujet, en vue de dresser un index de consultation facile contenant des résumés des propositions. Le plan du répertoire reflète en grande partie cet objectif.

On vise également deux autres objectifs : d'abord offrir une étude historique aussi complète que possible et, ensuite, mettre à la disposition de ceux qui sont profanes en la matière un ouvrage qui leur permettra de s'initier à la question.

Compte tenu de ces objectifs, la portée de la troisième édition du répertoire a été quelque peu élargie par rapport à celle de la deuxième édition. L'ouvrage comprend maintenant des discussions théoriques et des énoncés de principe concernant la vérification et le respect des accords.

2. Nations Unies. Assemblée générale. Résolution 40/152(0), 1e 16 décembre 1985. (Voir résumé A19.2(I85)).

Cette troisième édition remplace les deux éditions antérieures du répertoire publiées respectivement en 1980 et en 1982.³

Portée

Le répertoire présente des propositions de vérification émanant de milieux tant gouvernementaux que non gouvernementaux. Les auteurs se sont efforcés de rassembler toutes les propositions revêtant une importance majeure parmi les propositions non classifiées, du point de vue de la sécurité, qui ont été mises de l'avant par les représentants de gouvernements de 1984 à 1986 devant la Conférence sur le désarmement, de 1979 à 1983 devant le Comité du désarmement, de 1969 à 1978 devant la Conférence du Comité du désarmement et de 1962 à 1969 devant le Comité des dix-huit puissances sur le désarmement (ENDC). On a également tenu compte des traités et des accords sur la limitation des armements qui renferment des dispositions concernant la vérification. Cependant, il n'est pas possible de certifier qu'on a résumé la totalité des propositions et des accords gouvernementaux.

L'analyse des propositions émanant de milieux non gouvernementaux a porté sur la période allant de 1962 à 1985, bien qu'on se soit concentré davantage sur la dernière décennie. Il s'agit de propositions venant de milieux universitaires ainsi que d'organismes internationaux et publiées dans des articles de revues, des opuscules, des dossiers et des livres. On a fait une étude moins étendue de l'année 1986. Le lecteur trouvera à la fin du Volume 3 du répertoire une bibliographie supplémentaire des articles qui n'ont pas été reçus assez tôt pour être inclus dans le volume.

Par proposition de vérification, on entend un exposé ou un document dans lequel on préconise, appuie, rejette, décrit ou évalue un système de vérification. Seules les propositions jugées solides ont fait l'objet d'un condensé. Les exposés appuyant ou rejetant une proposition sont généralement ajoutés au condensé de la proposition en question. La plus grande partie des exposés généraux sur la nécessité ou l'absence des mesures de vérification n'ont pas été incorporés au répertoire. Cependant, cette troisième édition comprend des discussions théoriques et des énoncés de principe concernant la la vérification et l'observation. Il faut souligner également que, dans le cadre de ces limites, le répertoire n'a pas

3. CD/99, le 12 juin 1980; publié aussi comme suit : Alan Crawford et coll., Compendium of Arms Control Verification Proposals (Ottawa: Operational Research and Analysis Establishment, Department of National Defence, June 1980), ORAE Report No. R73. CD/275, le 7 avril 1982; publié aussi comme suit : Alan Crawford et coll., Compendium of Arms Control Verification Proposals, Second Edition, (Ottawa: Operational Research and Analysis Establishment, Department of National Defence, March 1982), ORAE Report No. R81.

été conçu pour consigner tout ce qui a été dit par tous les pays sur la question de la vérification. Les lecteurs qui désirent obtenir une liste plus complète des textes de déclarations des gouvernements faites, à l'égard de la vérification, à la Conférence sur le désarmement et aux conférences antérieures doivent se reporter à la publication suivante :

Compendium of Verbatim Statements on Verification.
Ottawa: Department of External Affairs, 1985. (3 volumes).

Les propositions de vérification ayant trait à des mesures visant à accroître la confiance sont généralement exclues de la troisième édition du répertoire. Les lecteurs qui s'intéressent à ce sujet doivent se reporter à la publication suivante :

Compendium of Confidence-Building Proposals, Second Edition.
Ottawa: Operational Research and Analysis Establishment,
Department of National Defence, forthcoming.

Forme des condensés

Le résumé de chacune des propositions de vérification est divisé en sections distinctes comme suit :

- (1) Problème de limitation des armements : le sujet ou l'objectif de limitation des armements auquel la proposition se rattache.
- (2) Type de vérification : les méthodes de vérification en cause, c'est-à-dire le genre d'inspection, l'équipement d'observation, l'organisme ou les procédures de surveillance nécessaires pour vérifier jusqu'à quel point un pays signataire respecte l'accord proposé de limitation des armements. Dans le cas de discussions théoriques sur la vérification, la désignation "Vérification - généralités" est employée.
- (3) Source : le document d'où a été tirée la proposition, et tout document connexe.
- (4) Résumé : les grandes lignes (résumé) de la proposition de vérification, donnant une bonne idée des principales caractéristiques des mécanismes de vérification proposés.
- (5) Choix de commentaires des états : dans quelque cas, on a ajouté certaines observations sur les propositions formulées par les pays participants.

Division de l'ouvrage

La publication du présent ouvrage en trois volumes a pour but fondamental de rendre accessibles des données écrites sur la vérification de la limitation des armements; il ne s'agit pas d'émettre un jugement sur l'efficacité des diverses propositions. Compte tenu, cependant, du nombre

élevé de propositions, il a été nécessaire de présenter les résumés sous une forme facilitant la consultation, ce qui a obligé les auteurs à faire un choix empreint nécessairement d'une certaine subjectivité. Mais ceux-ci se sont efforcés d'éliminer le plus possible cet élément de subjectivité.

On avait le choix entre diverses formules, mais on a retenu la méthode de vérification comme division élémentaire puisque c'est la vérification qui est le thème du répertoire. Les condensés de propositions sont donc répartis en 17 chapitres; seize de ces chapitres portent sur une méthode particulière de vérification et présentent les propositions qui sont censées faire appel à cette méthode comme instrument privilégié de vérification. Le 17^e chapitre (le chapitre A) comprend des résumés qui ne renvoient à aucune méthode de vérification particulière, d'ordinaire parce qu'ils examinent le sujet à un niveau général et théorique. Après le premier chapitre, la disposition des chapitres va de la méthode de vérification la plus envahissante à celles qui sont les moins envahissantes.

Les condensés se retrouvant dans chacun des chapitres sont présentés suivant le problème ou l'objectif de limitation des armements auquel ils se rapportent, par ordre croissant de spécificité (depuis "Tout accord de limitation des armements" jusqu'à "Armes classiques").⁴ Les propositions comportant le même problème ou objectif de limitation des armements sont subdivisées en ordre alphabétique selon la première subdivision énumérée (le cas échéant); par exemple, "Armes nucléaires - missiles balistiques" est suivi d'"Armes nucléaires - missiles de croisière", etc. Les propositions portant sur la même subdivision de sujet de limitation des armements sont disposées en ordre chronologique à partir des plus anciennes. Les propositions portant sur la même subdivision de sujets et ayant la même date sont disposées en ordre alphabétique selon la source.

Chaque chapitre commence par une courte introduction décrivant en termes généraux les éléments importants de la méthode de vérification en question.

Le chapitre A porte sur des discussions générales relatives à la vérification.

Les chapitres B à F portent sur la vérification faisant appel à l'inspection directe, sur place, des installations, soit inspection générale ou complète (chapitre B), inspection sélective ou partielle (chapitre C), clauses de garantie de l'entente internationale sur l'énergie nucléaire (chapitre D), inspection progressive, c'est-à-dire s'intensifiant au fur et à mesure que la confiance s'installe (chapitre E), et postes de contrôle (chapitre F).

4. Voir, à la section ci-dessous intitulée "Classification des objectifs de limitation des armements", une liste de ces sujets.

Le chapitre G porte sur la vérification faisant appel à l'examen des dossiers.

Le chapitre H décrit les propositions qui utilisent des techniques d'entrevue et les propositions de vérification faisant appel à la conscience de chaque citoyen ayant le devoir de signaler les cas de violation dont son propre gouvernement pourrait se rendre coupable.

Les chapitres I à K traitent de la vérification au moyen de l'observation directe, et décrivent les divers instruments prévus à cette fin, en précisant leurs limitations : détecteurs à courte portée (chapitre I), dispositifs de télédétection (chapitre J) et détecteurs sismiques (chapitre K).

Les chapitres L et M étudient la vérification faisant appel à l'évaluation des informations tirées soit de publications (chapitre L), soit de rapports de situation échangés librement entre les nations (chapitre M).

Le chapitre N examine les propositions de vérification faisant appel à des mécanismes d'auto-supervision ou d'auto-inspection.

Les chapitres O à Q étudient les mécanismes permettant de s'assurer que les cas soupçonnés de violation sont examinés au niveau international. Le chapitre O traite des procédures d'instruction des plaintes, le chapitre P des organismes internationaux de contrôle, et le chapitre Q, des conférences d'examen.

Classification des objectifs de limitation des armements

Il est probable qu'un grand nombre de ceux qui utiliseront le répertoire voudront se renseigner sur la négociation d'un accord précis de limitation des armements, par exemple, le contrôle de la production des armes chimiques. Pour leur faciliter les choses, on a donc prévu un double classement, c'est-à-dire qu'en plus du classement par méthodes de vérification donnant lieu à la division en chapitres, on trouve un classement par objectifs de limitation des armements. L'examen de la série de propositions révèle sept grands objectifs, ou sujets, de limitation des armements, auxquels on a ajouté la catégorie "Tout accord de limitation des armements" pour les cas où la méthode de vérification est réputée avoir une applicabilité générale. Certaines de ces catégories ont été subdivisées dans le but d'assurer une plus grande spécificité. Voici les huit principaux sujets ou objectifs et leurs principales subdivisions :

- (1) Tout accord de limitation des armements
- (2) Désarmement général et complet
- (3) Contrôle des armes au niveau régional
- (4) Contrôle des armes au niveau régional
- (5) Contrôle des armes nucléaires
 - a) Technologie des ogives
 - i) Interdiction complètes d'armes nucléaires

- ii) Arrêt de la production de matières fissiles
- iii) Interdiction partielle des essais
- iv) Explosions nucléaires pacifiques
- v) Explosions nucléaires pacifiques
- vi) Recherche-développement
- b) Technologie des systèmes de lancement
 - i) Systèmes de missiles anti-balistiques
 - ii) Missiles balistiques
 - iii) Missiles de croisière
 - iv) Avion piloté
 - v) Essais de missile
 - vi) Missiles balistiques mobiles
 - vii) Véhicules de rentrée
- (6) Contrôle des armes chimiques et biologiques
 - a) Agents binaires
 - b) Destruction des installations et(ou) des stocks
 - c) Production
 - d) Recherche-développement
 - e) Stockage
 - f) Utilisation
- (7) Restrictions applicables aux autres armes de destruction massive
 - a) Modification de l'environnement
 - b) Armes radiologiques
- (8) Contrôle des armes classiques
 - a) Aéronefs
 - b) Forces terrestres
 - c) Navires

Index

L'accès par sujet est possible grâce à l'index général qui se trouve à la fin du Volume 3 de l'ouvrage. Cet index permet l'accès soit par type de vérification ou par objectif de limitation des armements. Il indique aussi les synonymes et porte des renvois réciproques entre les mots et les phrases.

L'ouvrage comporte en outre un index des auteurs des propositions. Cet index d'auteurs englobe les particuliers, les organismes non gouvernementaux, gouvernementaux et intergouvernementaux. Il sert aussi de bibliographie du contenu du répertoire. Enfin, il comprend une liste des documents de travail établis par le Comité du désarmement, la Conférence du Comité du désarmement et le Comité des dix-huit puissances sur le désarmement (ENDC), et classés par numéros.

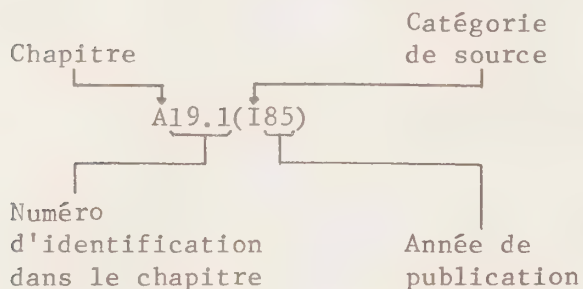
Numéros de référence

Les numéros de référence, en plus d'indiquer l'emplacement du condensé de proposition dans le répertoire, permettent également d'obtenir d'autres renseignements. La première lettre à l'extérieur des parenthèses

indique le chapitre, précisant par le fait même la méthode de vérification qui prédomine dans la proposition. Les chiffres qui suivent immédiatement la première lettre indiquent la position du résumé dans le chapitre. Les résumés sont disposés de façon décimale; ainsi le résumé A20.59 se situerait entre les résumés A20.5 et A20.6.

La lettre apparaissant entre parenthèses désigne la catégorie de la source, soit A pour les milieux d'enseignement (un particulier, en général), G pour les milieux gouvernementaux, I pour les organismes intergouvernementaux, et T s'il s'agit d'un accord réel de limitation des armements. Enfin, les deux chiffres apparaissant entre parenthèses après la mention de la source indiquent l'année au cours de laquelle la proposition a été présentée.

Clé des numéros de condensé de proposition



Codes de source :

A = Milieu d'enseignement
G = Milieu gouvernemental
I = Organisme intergouvernemental
T = Traité

Codes de chapitre :

A Vérification, généralités
B Inspection générale sur place
C Inspection sélective sur place
D Clauses de garanties de l'entente internationale sur l'énergie nucléaire
E Inspection progressive ou de zone sur place
F Postes de contrôle
G Examen des dossiers
H Inspection psychologique ou non physique
I Détecteurs à courte portée
J Dispositifs de télédétection
K Détecteurs sismiques
L Etude de publications
M Echange international de renseignements
N Auto-supervision
O Procédure d'instruction des plaintes
P Organismes internationaux de contrôle
Q Conférence d'examen

Commentaires

Les commentaires sur le contenu ou la forme du répertoire seront les bienvenus. Les suggestions relatives aux éditions futures seront particulièrement appréciées. Veuillez faire parvenir ces commentaires à l'adresse suivante :

Le rédacteur en chef
Répertoire des propositions visant la
vérification de la limitation des armements
Direction du contrôle des armements et du désarmement
Ministère des Affaires extérieures
125, promenade Sussex
Ottawa (Ontario)
Canada
K1A 0G2

LIST OF ABBREVIATIONS

ABM	- Anti-Ballistic Missile
ALCM	- Air Launched Cruise Missile
ASAT	- Anti-Satellite Weapon
ASBM	- Air-to-Surface Ballistic Missile
BMEWS	- Ballistic Missile Early Warning System
BW	- Biological Weapon/Warfare
CBM	- Confidence-Building Measure
CBW	- Chemical and Biological Weapon/Warfare
CCD	- Conference of the Committee on Disarmament (1969-1978)
CCSBMDE	- Conference on Confidence- and Security-Building Measures and Disarmament in Europe (the Stockholm Conference)
CD	- Committee on Disarmament (1979-1983)/Conference on Disarmament (1984-)
COMINT	- Communications Intelligence
CSBM	- Confidence- and Security-Building Measures
CTB	- Comprehensive Test Ban
CW	- Chemical Weapon/Warfare
ELINT	- Electronic Intelligence
ENDC	- Eighteen Nation Disarmament Committee (1962-1969)
ENMOD	- Environmental Modification
EW	- Early Warning
FOBS	- Fractional Orbital Bombardment System
FROD	- Functionally Related Observable Difference
GCD	- General and Complete Disarmament
GEODSS	- Ground-Based Electro-Optical Deep Space Surveillance
GLCM	- Ground Launched Cruise Missile
GTS	- Global Telecommunications System
IAEA	- International Atomic Energy Agency
IDO	- International Disarmament Organization
INF	- Intermediate (Range) Nuclear Forces
ISMA	- International Satellite Monitoring Agency
IVO	- International Verification Organization
kt	- kiloton (TNT equivalent)
LTBT	- Limited Test Ban Treaty
m _b	- seismic magnitude of body wave (short period P waves) measured on Richter scale
M _s	- seismic magnitude of surface waves (Rayleigh waves)
MARV	- Manoeuvrable Reentry Vehicle
MBFR	- Mutual and Balanced Force Reduction (Talks)
MIRV	- Multiple Independent(ly) (Targeted) Reentry Vehicle
MRV	- Multiple Reentry Vehicle
NPT	- Non-Proliferation Treaty
NTM	- National Technical Means
NWFZ	- Nuclear Weapon Free Zone
OAS	- Organization of American States
OPANAL	- Agency for the Prohibition of Nuclear Weapons in Latin America
OSI	- On-Site Inspection
OTH	- Over-The Horizon (Radar)
PNE	- Peaceful Nuclear Explosion
PNET	- Peaceful Nuclear Explosions Treaty

PRC	- People's Republic of China
R&D	- Research and Development
RECOVER	- Remote Continuous Verification (system)
SALT	- Strategic Arms Limitation Talks/Treaty
SCC	- Standing Consultative Commission
SIPRI	- Stockholm International Peace Research Institute
SLBM	- Submarine Launched Ballistic Missile
SLCM	- Sea Launched Cruise Missile
TTBT	- Threshold Test Ban Treaty
UN	- United Nations
UNEF	- United Nations Emergency Force
UNEP	- United Nations Environment Program
UNGA	- United Nations General Assembly
UNSSOD I	- First United Nations Special Session on Disarmament (1978)
UNSSOD II	- Second United Nations Special Session on Disarmament (1982)
WEU	- Western European Union
WHO	- World Health Organization
WMO	- World Meteorological Organization
WWSSN	- World-Wide Standardized Seismograph Network

CHAPTER A

VERIFICATION - GENERAL

There is much useful and interesting material in the literature on verification which does not refer to a specific method or type of verification. Because this material might not be covered in a literature search with a restrictive definition of a verification proposal, this edition of the Compendium has widened the scope of coverage to include such material. This Chapter contains verification proposals which address a variety of general topics with no specific reference to a particular type of verification. There are proposals which take a theoretical approach to the requirements of verification. Proposal A2(I78) is a good example of this type of general discussion of verification. Some proposals discuss instances of alleged non-compliance with arms control agreements (see, for example, abstract A12(A84)). Compliance refers to the actual behaviour of a party with regard to the provisions of an arms control agreement whereas verification is the mechanism for determining whether that the behaviour is in accordance with the provisions of the agreement. Discussions of compliance have had direct relevance to verification because they indicate weaknesses and strengths of the systems which provide compliance information.

Proposal abstracts which discuss cases of non-compliance where a complaints procedure is specified are located in Chapter 0, whereas abstracts which discuss compliance or complaints of non-compliance without specifying a particular complaints procedure are located in this Chapter. References to alleged violations of specific arms control agreements can be found via the Subject Index under the name of the arms control agreement (e.g. "SALT II - Violations"). Lastly, this Chapter contains proposals which suggest that verification of a particular activity or weapons system is very difficult or impossible without identifying any specific verification techniques.

A1(A61)

A1(A61)

Proposal Abstract A1(A61)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Iklé, Fred C. "After Detection - What?". Foreign Affairs (1961): 208-220.

4. **Summary:**

The technical question of detection dominates domestic debate and international negotiations; but detecting violations is not enough. The political and military consequences of a violation once detected alone will determine whether or not the violator stands to gain in the end. Before entering an arms control agreement it is necessary to know both that there is a technical capability to detect violations and that the US and the rest of the world will be in a position to effectively react politically, legally and militarily. Violators will not be deterred simply by risk of detection. Deterrence results from the fear that what a violator gains from the violation, will be outweighed by the loss he suffers from the victim's reaction. It is necessary, therefore, to study not only what a violator can do to avoid detection but also what he may do to escape the penalty of being detected.

World Opinion:

World opinion, it is argued, will help enforce disarmament agreements by causing the violator loss of prestige and influence. But world opinion is too amorphous a concept to determine how it can deter a violator. One reason is that world opinion's memory is short. Evidence of a violation may be equivocal and involve technicalities hard for the public to understand. Moreover, there are stratagems by which the violator can avoid or mitigate aroused world opinion:

- (1) he can frustrate the international inspection system;
- (2) he can blame the other side for violating first;
- (3) he can accuse the other side of fabricating the evidence as a pretext for breaking the agreement;
- (4) he can assert that the agreement is obsolete;
- (5) he can "cover himself with shame"; and
- (6) he may justify his actions on the ground of welfare of "the people" or the "requirements of history".

Political Reaction of the Injured Party:

To be effective, sanctions must be applied by injured governments. Democratic governments have special problems in this regard. Governments must first acknowledge any violation but:

- (1) a government may be reluctant to do this if the evidence is equivocal or based on secret intelligence;
- (2) any such acknowledgement might be exploited by domestic opposition groups; and
- (3) since interpretation of complicated evidence is often a matter of judgement, a government's biases against acknowledging the violation might come into play especially if the government had previously been forced to defend the agreement.

It would be difficult for democratic governments to institute important responses without convincing legislative bodies and the public.

The injured government must be willing to increase military expenditures and to offend pacifist feelings. Ironically, it may be domestic public opinion (or the governments perception of it) that prevents effective sanctions.

The injured government must accept any new risks created by its reactions. Other long-range policies may be jeopardized. An injured party might feel it safer to write off the violation rather than risk new dangers of rearmament.

The injured party may also have to obtain agreement from its allies before it can react.

Military Responses:

Military responses can be confined to measures to restore the status quo ante ("restorative measures") or they can go further. Deterring violations has often been oversimplified by assuming that a detected violation would be taken care of by the cancellation of the agreement and the application of restorative measures. But three conditions are needed for restorative measures to be an adequate deterrent:

- (1) The violator must fear the risk of detection.
- (2) He must also fear that a detected violation will cause an unwanted response by the injured party.
- (3) He must not expect to gain an irrevocable advantage by violating the agreement, compared to what he derives by observing the agreement. In particular, violation of a part of an agreement cannot be deterred by the threat of restorative measures confined only to this particular party. Additional sanctions are needed, otherwise the violator could break only those measures that are not to his advantage. If his violation is ignored or that portion of the agreement abandoned, he gains because individual components are inevitably of unequal value to the parties.

Military and Political Measures Beyond Restorative Measures:

Such additional measures must be credible. By far the most important and practical penalty would be an increase in military effort beyond that required to restore the status quo ante. This may not mean a large budget increase. Changes in deployment and readiness of weapons might be appropriate. There is a danger, however, that such reactions may renew or accelerate an arms race.

Thus two sacrifices may be necessary to deter violators: greater expenditures on defence and a risk of stepping up the arms race.

Political sanctions are likely to be less effective than increased defence effort, though they play a complementary role.

How can penalties of violations be made more inevitable and severe and the gains of violation more dubious? Evidence of violations must be authoritative and impartial to impress the public. Findings by an international organization will be influential in this context, but such bodies have many weaknesses that a violator can exploit. One should avoid agreements that are administratively closed to intelligence information.

Deterrence of evasions might also be strengthened if democratic governments simplified and speeded up their decision-making processes. Special parliamentary committees might assume an explicit responsibility to mobilize legislative support for any necessary response to violations.

To increase coordination with allies arrangements might be made in advance for joint action. An inter-allied agency might be set up permanently to evaluate evidence of violations. Such an agency need not recommend action, though its findings would be publicized.

A program to deter violations of arms control agreements is analogous to a strategy to deter nuclear attack suggesting that ideas from the latter might be applicable to the former. First, there is the problem of whether it is rational to carry out a threat if deterrence fails. Second, accidental violations of an agreement must be controlled for, just as the risk of accidental nuclear war must be. Third, there is some similarity between the advantage of a first strike and the advantage of gaining time through evasion of certain arms-control agreements.

A1.1(A63)

A1.1(A63)

Proposal Abstract A1.1(A63)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
O'Sullivan, Thomas. "Disadvantages of Reliable Inspection".
Bulletin of the Atomic Scientists no. 19 (March 1963): 18-19.

4. **Summary:**

The author postulates that in some circumstances reliable international inspection works to the advantage of the violator of an arms control agreement and to further injure the complying party. This suggests that US insistence on such inspection may require reexamination. Two characteristics of international inspection are important in this context:

- (1) because of its open nature, international inspection draws world attention not only to the violation but also to the complier's response, and
- (2) the violator also becomes immediately aware that his violation has been detected.

The author assumes in his examples that the parties have reasonably accurate intelligence data from their national machinery.

The author suggests, first, that if a violation is made public then the violator is forced to justify his acts and this may harden his commitment to continue violating. The complier may also evaluate the violation as not being of great technical significance or a threat to its national security and may not wish to destabilize the situation by reacting to the violation. In such circumstances, the complier could either ignore the violation or quietly in a face-saving fashion negotiate with the violator to obtain his adherence.

Sometimes, any negative effects of a violation may be cancelled out by a complier's activities in other areas such that the complier may be quite happy to see the violator continue to waste his resources by continuing his violation. In other circumstances the complier may decide that a response in kind is inappropriate but that some other concession should be sought. Negotiating such a concession might be easier if the violation was not made public by international inspection.

It is easy to assume that reliable international inspections are required for every arms control measure or, if not required, they are never harmful. However, the above examples suggest that it is necessary to balance the verification information needs arising from any agreement with the effects, both good and bad, of machinery provided to supply the information.

A1.2(A78)

A1.2(A78)

Proposal Abstract A1.2(A78)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Lord, Carnes. "Verification and the Future of Arms Control".
Strategic Review 2 (Spring 1978).

4. **Summary:**

This article examines the growing interest in verification and finds that the issue has become increasingly controversial as debate moves away from the more technical aspects and into the political arena. American skepticism has grown in the face of alleged Soviet violations, and these suspicions have in turn prompted a demand for more stringent verification. The emphasis here is on the recognition of political aspects of verification which promote deterrence and create confidence at the domestic and international levels.

Historically, verification emerged as a significant issue with the relatively obscure action of the United States Congress in amending the Arms Control and Disarmament Act. In 1977 the Derwinski Amendment required the Arms Control and Disarmament Agency to file statements on verification issues and "report on the verifiability of arms control provisions prior to the actual conclusion of an agreement" (p.25). This action was in response to a generally growing feeling within the United States that more effective verification procedures were needed.

There are three basic purposes of verification: (1) detection of violations or of evidence pointing to violations; (2) deterrence of violations; and (3) the creation of domestic and international confidence in an agreement" (p. 26). Technical capabilities will determine the ability of verification to detect violations, while deterrence depends on a nation's willingness to respond to violations. Previously, the United States had emphasized technical expertise rather than confidence-building. It should be remembered, however, that confidence-building has certain requirements of publicity that are difficult to satisfy "where total reliance is placed on highly sensitive methods of technical intelligence, as is the case with SALT" (p.27).

Thus, the limits of adequate verification should be redefined in light of the political significance of violations. This would require a more visible verification capability, and would demand an "active and vigorous response" to violations which may be based on imperfect evidence. The author essentially advocates a more stringent approach to verification, to the extent of sacrificing diplomatic concerns to the interests of domestic support and enhanced deterrence.

A2(I78)

A2(I78)

Proposal Abstract A2(I78)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
United Nations. Secretariat. "Disarmament and verification".
A/AC.187/109, 17 April 1978.

4. **Summary:**

This background paper on verification provides a general, theoretical examination of the subject. It also includes the texts of provisions regarding verification contained in existing arms control and disarmament agreements. The purpose of verification is "to serve as a factor in making the initial and continued adherence of States to a disarmament agreement possible, by ascertaining compliance with the agreement and giving assurances to that end" (p.15). To achieve this, verification provisions are designed to pursue one or another of the following objectives: (1) protecting the security of the parties to the agreement; (2) deterring violations; (3) permitting a response in the case of non-compliance; and (4) allowing states to demonstrate their own compliance with an agreement.

The particular method of verification chosen will depend on the scope and nature of the agreement and on technological factors. Verification may be implemented through national or international means or through a combination of the two. Acceptance of verification provisions often depends on "adequacy" and "acceptability". "Adequacy" means that the system should meet an agreed standard based on political, technical and financial considerations. In practical terms, the confidence level each party associates with a method verification will be "the degree of confidence with which it is able to make a statement as to whether an act of non-compliance has taken place" (p.20). A purely technical standard of adequacy may be set only where the objective of verification is "precisely quantifiable".

Finally, the various possible responses to a violation are discussed. The other party may: withdraw, terminate or denounce the agreement; take international action; deny the offender any treaty benefits; or violate the treaty by its own action. Thus, verification may be viewed as a "trigger" for counteraction.

A2.1(I78)

A2.1(I78)

Proposal Abstract A2.1(I78)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
United Nations. General Assembly. Special Session on Disarmament. "Final Document". 1 July 1978.

4. **Summary:**

The Final Document of UNSSOD I represents an authoritative statement of the views of the world community. It was adopted by consensus and includes several paragraphs relating directly to verification. These are reproduced below in their entirety:

Paragraph 31. Disarmament and arms limitation agreements should provide for adequate measures of verification satisfactory to all parties concerned in order to create the necessary confidence and ensure that they are being observed by all parties. The form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement. Agreements should provide for the participation of parties directly or through the United Nations system in the verification process. Where appropriate, a combination of several methods of verification as well as other compliance procedures should be employed.

Paragraph 91. In the context of international disarmament negotiations, the problem of verification should be further examined and adequate methods and procedures in this field be considered. Every effort should be made to develop appropriate methods and procedures which are non-discriminatory and which do not unduly interfere with the internal affairs of other States or jeopardize their economic and social development.

Paragraph 92. In order to facilitate the conclusion and effective implementation of disarmament agreements and to create confidence, States should accept appropriate provisions for verification in such agreements.

A2.2(I81)

A2.2(I81)

Proposal Abstract A2.2(I81)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Union of Soviet Socialist Republics. CD/PV.119, 31 March 1981.
4. **Summary:**

The USSR representative stated that verification is an important issue upon which he wished to present some general considerations. First, the concept that verification should precede disarmament is rejected by the Soviet Union. Similarly, the assumption that the possibilities of verification should determine the scope of the disarmament agreement is also rejected. The concept of "arms control" has the great drawback that control over existing armaments takes the place of verification of disarmament. Under this pretext, repeated attempts have been made to damage the defence interests of states.

The "concept of distrust", under which every party is regarded as a potential violator, is also rejected. On the basis of this concept, "the significance of intrusive international verification is being exaggerated in every possible way and comprehensive, systematic and total international on-site inspections are being proposed, while at the same time the effectiveness of the contemporary national technical means of verification is being underestimated and neglected" (p.14).

The Soviet representative stressed that the USSR is in favour of strict and effective international control. The USSR has no more reason for trusting others than others have to trust the USSR. The main function of a system for ensuring compliance, of which verification is an integral part, is to assure the parties that agreements are observed by other parties and, through cooperation, to facilitate resolution of questions in dispute.

The elaboration of specific forms of verification should be based on a number of principles which can be summarized as follows:

- (1) "The conduct of verification should in no way prejudice the sovereign rights of States or permit interference in their internal affairs."
- (2) "Verification cannot exist without disarmament but must stem from a precise and clear agreement on measures for the limitation of armaments and for disarmament."
- (3) "The scope and forms of verification should be commensurate with the character and scope of the specific obligations established in the relevant agreement relating to the limitation of armaments and disarmament."

- (4) "The detailed elaboration of the verification provisions is possible only after an agreement on the scope of the prohibition has been mapped out."
- (5) "We proceed from the assumption that a State becomes a party to a convention not in order to violate it but in order to abide strictly by the obligations it has assumed under it, and therefore that verification should not be built upon the principle of total distrust by States of one another, and should not take the form of global suspiciousness, but should simply be a link -- perhaps a very important one but still only a link -- in the chain of other measures ensuring confidence in the observance of the convention by all its parties."
- (6) "International forms of verification should be limited."
- (7) "We also take into account the very important circumstances that in the conditions of the present-day development of science and technology, any fairly less serious violation of an agreement in the field of disarmament, including the sphere of chemical weapons, has no chance of remaining undetected for very long."

The resolution of verification issues has always depended on the existence of the political will to conclude the agreement. The USSR resolutely opposes...

the elaboration of verification measures in isolation from the specific contents of this or that measure pertaining to the limitation of armaments or disarmament, its nature and significance in a broader context of disarmament, in isolation from the possible existence of other international norms or agreements ensuring the observance of the measure in question, and without seeing in due proportion the danger of non-compliance with this measure as compared with the negative consequences of superfluous interference in the peaceful activities of States and of the disclosure of commercial and technical secrets in certain spheres of industry. (p.17)

The USSR is in favour of "reasonable, balanced verification on a scale that is truly necessary - no more, no less". (p.17)

A2.3(G81)

A2.3(G81)

Proposal Abstract A2.3(G81)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

Verification - general

3. **Source:**

India. "Working paper on the question of verification in the field of disarmament". CD/209, 11 August 1981.

4. **Summary:**

Disarmament and controls are inseparable and should be tackled simultaneously as integral parts of a single problem. It is wrong to make a fetish of verification and to devise a machinery of controls in the absence of genuine measures of arms limitation and disarmament. This amounts to putting the cart before the horse. There is no merit in sterile and abstract discussions of verification without reference to concrete arms limitation and disarmament measures.

Strong political will is a prerequisite to reaching agreement. Once such will exists, devising appropriate controls will not be difficult. Because one hundred percent fool-proof verification is not possible, a degree of mutual trust must also exist "before a practical, least-onerous system of verification can be devised". Controls must be based on objective, scientific and non-discriminatory criteria and should apply to all states. Controls should not unduly interfere with the internal affairs of states or jeopardize their economic and social development.

Verification should not become a camouflage for lack of political will and a priori refusal to trust others.

A3(A82)

A3(A82)

Proposal Abstract A3(A82)

1. **Arms Control Problem:**

- (a) Any arms control agreement
- (b) Regional arms control - Europe
- (c) Chemical weapons - stockpiling
 - destruction of stocks
 - destruction of facilities
- (d) Nuclear weapons - comprehensive test ban
 - proliferation
 - nuclear weapon free zone

2. **Verification Type:**

- (a) Verification - general
- (b) On-site inspection - selective
 - challenge
 - IAEA safeguards
- (c) Remote sensors
- (d) International exchange of information - declarations
- (e) Seismic sensors - international network
 - intra-border stations
- (f) Complaints procedure - consultative commission
- (g) National self-supervision
- (h) International control organization

3. **Source:**

Independent Commission on Disarmament and Security Issues. Common Security: A Programme for Disarmament. London: Pan Books, 1982. (Palme Commission).

4. **Summary:**

Under the chairmanship of Olof Palme of Sweden, the Independent Commission discussed proposals to achieve arms limitation and disarmament. Their ultimate goal is general and complete disarmament, but the Commission focussed on more limited measures designed to curb and reverse the arms race. A section of the report discusses verification in relation to arms negotiations (pp. 134-137).

The report notes that "verifying compliance with arms agreements is always an uncertain process, but the degree of uncertainty can be reduced by measures which assist the use of national technical means" (p.135). New weapons systems may complicate the negotiation of verifiable arms agreements. Mobile systems, smaller systems and multipurpose systems which can use either nuclear or conventional warheads can make verification difficult. Steps should be taken to prevent these systems from posing obstacles. (The report does not specify what those steps would be.) Verification must be linked to the scope and design of the treaty and the more comprehensive a treaty is, the more extensive the verification provisions should be.

However, "foolproof verification is clearly unattainable and insistence thereon would only make agreements impossible" (p.136).

Any arms control agreement should contain the following basic provisions. First, parties should provide the data necessary for negotiating and implementing the agreement. Second, parties should avoid deliberately concealing the objects of the agreement. Third, a forum for discussing concerns about compliance should be established. The Standing Consultative Commission created by the SALT agreements (see abstract J67(T72)) provides a good example of this kind of body.

National technical means of verification should be sufficient to verify many arms control agreements, but cooperative measures may also be necessary in some cases. On-site inspections should be as limited as possible, but should not be ruled out in principle. The exchange of data on military forces and the exchange of military observers could provide important confidence-building measures.

With regard to specific arms control agreements, the Commission recommends the creation of a battlefield nuclear weapon free zone beginning in Central Europe and eventually extending from the northern to the southern flanks of the two alliances. Short-range nuclear weapons and storage sites for nuclear munitions would be prohibited from the zone. Verification of these provisions would have to include a limited number of on-site inspections in the zone on a challenge basis.

The Commission calls for the establishment of a chemical weapon-free zone in Europe, beginning with Central Europe. Parties to this agreement would declare the locations of chemical weapon stockpiles and negotiate procedures to verify the destruction of stocks and to monitor compliance. A few on-site inspections on a challenge basis should be provided for.

Negotiations should proceed on a comprehensive test ban treaty. Effective verification of this agreement could be provided by the International Seismic Data Exchange, agreed procedures for consultations, on-site inspection and a network of national seismic stations.

A chemical weapon disarmament treaty involving the destruction of chemical weapon stockpiles and production facilities should also be negotiated. International means of verification are necessary in addition to national means because many developing states do not possess adequate technology for national verification. Voluntary confidence-building measures should also be initiated. A permanent consultative commission composed of all the parties to a treaty and assisted by a small technical staff should monitor implementation and compliance with the treaty and establish an effective complaints procedure.

Nuclear proliferation can be halted if all states adhere to the Non-Proliferation Treaty of 1970 and if safeguards are placed on the nuclear fuel cycle. Sensitive parts of the cycle should be placed under international authority. The authority could establish international fuel banks, international plutonium storage facilities and internationally controlled sites for spent fuel storage.

A4(A83)

A4(A83)

Proposal Abstract A4(A83)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - ballistic missiles
 - cruise missiles
 - comprehensive test ban
 - partial test ban
 - missile tests
 - manned aircraft
- (c) Chemical weapons - production
 - stockpiling
 - binary agents
- (d) Conventional weapons - ground forces

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
 - control posts
- (d) Seismic sensors - intra-border stations
- (e) International exchange of information

3. Source:

Alford, Jonathan. "Confidence-Building Measures and Verification."
In: Confidence-Building Measures: Proceedings of an International Symposium 24 - 27 May 1983 at Bonn, pp. 61-78. Edited by Karl Kaiser. Bonn: Forschungsinstitut der Deutschen Gesellschaft Fur Auswartige Politik E.V., December 1983.

4. Summary:

There are two ways to look at the relationship of confidence-building and verification: 1) there are the ways verification and compliance can be confidence-building measures (CBMs) and ways CBMs can aid verification, and 2) there is the question of verification of CBMs. Most of the paper deals with the former.

The author begins by making a distinction between CBMs as building trust and CBMs as building self-confidence. He is mainly concerned with the mechanism of trust and the extent to which trust is dependent on the ability to verify. He makes six general observations:

- (1) The stringency of verification demanded bears an obvious and direct relationship to the security consequences of violations.
- (2) The stringency of verification demanded bears also on the question of numbers.

- (3) In some circumstances even very small diversions or violations can have very large consequences.
- (4) There is a relationship between the rate of violation and the period of violation. Small violations over a long period can become significant.
- (5) It is easier to detect violations of total prohibitions of weapons types or military activities than variations of declared force levels or differential activities.
- (6) Verification requirements should not be made more demanding than is required to monitor the precise provisions of a specific agreement.

The author goes on to assert that arms control agreements are becoming more difficult to verify as technology makes weapons and military activities less visible. As arms control becomes more concerned with quantities, verification becomes more difficult.

Alford next discusses several specific arms control problems including strategic systems (START), intermediate nuclear forces (INF), mutual and balanced force reductions (MBFR), chemical weapons, and nuclear weapons testing; reviewing the verification problems and possibilities of each. Concerning START, the author believes that US verification capabilities have deteriorated because of the loss of Iranian monitoring facilities. It would greatly assist verification if missile tests were pre-notified as well as if details of location, trajectory and impact point were provided. However, even with improvements in NTMs some things will remain difficult to verify including: reload capabilities of modern ICBM launchers, mobile ICBMs, and SLCMs. To constrain these "would seem to demand substantial cooperative measures, at least, if not intrusive verification" (p. 65). If missile or platform production are not constrained than greater reliance on cooperative measures will be required.

For INF, the difficulty of verification is more one of definition than counting. Problems include mobile systems, reloads, and identification of new systems. Particularly difficult for definition are aircraft and small mobile missiles. To verify nuclear capable aircraft requires looking for: the presence of nuclear wiring, the existence of air delivered nuclear weapons in the stockpile, special facilities for handling nuclear materials, and training of crews in the nuclear mission. Any of these would appear to demand extensive intrusive verification.

Concerning MBFR, verification measures include establishment of databases, observers at entry and exit points, and sampling arrangements for unit strengths. Significant violations of manpower levels (eg. 10%) would be hard to conceal from this type of intrusive verification. Variations in numbers of large equipment should be easier to detect but by far the best arrangement is a total ban on certain kinds of equipment (eg. bridging/rafting equipment, tank snorkelling equipment and minefield breaching equipment) in forward areas. Such a ban would be verifiable by NTMs.

Verifying non-production and non-stockpiling of CWs requires intrusive inspection. Verifying CW delivery systems would seem to be virtually impossible because of their similarity to conventional systems. With the development of binary agents safety and security procedures will become less observable. Banning training in CW protective clothing would be observable by NTMs.

With regard to nuclear weapons testing, there are great doubts about the ability to distinguish low yield nuclear explosions from natural seismic activity or to calibrate nuclear yields precisely. Estimates of yields of Soviet tests are liable to errors of 100% under current arrangements. The placing of seismic detectors close to test sites would greatly increase confidence, so long as detectors are tamper-proof and serviced by the owners. Even so, there will remain doubts about small yield tests (a few kt) in a decoupling medium.

Regarding Soviet attitudes to verification, Alford suggests that for certain agreements which the USSR wants very badly, it is prepared to make such concessions on verification necessary to achieve agreement. He believes also that the USSR does not enter into arms control agreements intending to cheat and that it is well aware of the political consequences of being found out if it does cheat. Accordingly, a somewhat less than even chance of US detection would probably be too high a risk for the USSR.

Concerning the verification of CBMs, the author believes that this issue did not arise for the original set of Helsinki CBMs because the limits on military activities were so slight. But "the more you seek to regulate, the more important verification becomes". Consequently, future CBMs will come to look like other arms control measures in terms of their verification requirements.

Regarding the role of third parties or "honest brokers" in verification, Alford believes that such an arbitration authority suitable to both parties would be hard to find. Rather, the superpowers prefer to deal with each other rather than a "neutral" inspectorate.

As an example of verification difficulties caused by technological developments, Alford cites the cruise missile which can be used in a nuclear or conventional role, which are small, which have variable range and which are mobile and easily hidden. To verify cruise missiles will require agreement on how to count its launch platforms, cooperative arrangements to monitor testing and even a physical check on its production. It is an example of the awkward choices to be made between limiting operational flexibility in the interest of providing monitoring confidence. In fact, "verification difficulties due to technological change are generally accelerating faster than arms control can provide answers" (p. 78). Because of legitimate verification problems there is a danger of significant areas of arms competition being bypassed and of arms control becoming irrelevant to real security concerns. This is compounded by the possibility of different perceptions of the importance of verification arising between the US and its European allies.

A5(A83)

A5(A83)

Proposal Abstract A5(A83)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Buchan, Glenn C. "The Verification Spectrum". Bulletin of the Atomic Scientists 39, no. 9 (November 1983): 16-19.

4. **Summary:**

Three schools of thought on verification can be identified: the substantive, legalistic and metaphysical schools. The substantive school considers verification to be adequate if neither side could alter the strategic balance with undetected cheating. The legalistic school has stricter requirements and sees an arms control treaty as a legal contract, any violation of which is a serious matter regardless of the strategic significance of the violation. The metaphysical school is the most stringent of the three schools because it goes beyond the letter of an agreement to insist that behaviour conform to unwritten rules and display honourable intentions as well as observe the written treaty provisions.

Any consensus on verification will probably combine the three schools with a different measure of emphasis on the views of each school. The legalistic school received support from the Carter Administration which publicly stated that any violations of the SALT II treaty would be considered a serious matter which could lead to American abrogation of the treaty. The Reagan Administration's views that the Soviets have frequently violated the spirit of arms control agreements has given strength to the metaphysical school. However, there is no consensus on verification currently, and unless this emerges, the arms control community should consider alternatives to formal negotiations such as informal agreements.

A6(A83)

A6(A83)

Proposal Abstract A6(A83)

1. Arms Control Problem:
 - (a) Any arms control agreement
 - (b) Nuclear weapons - ballistic missiles
2. Verification Type:
 - (a) Verification - general
 - (b) On-site inspection
 - (c) Remote sensors
3. Source:

De Sutter, Robert J. Arms Control Verification: "Bridge" Theories and the Politics of Expediency. Ph.D. Dissertation, University of Southern California, 1983.

4. Summary:

DeSutter begins with a discussion, in general terms, of the need for verification of nuclear arms control agreements and the different impacts of the closed Soviet society and open American society on the verification issue. The paper suggests that the need for compliance verification is a "uniquely American problem" (p. 12) and creates opportunities for the Soviets which lead them to pursue arms control. In fact, Soviet rejection of intrusive measures of verification has meant that the Americans have had to compromise on their standards for verification in order to keep the arms control process going and have thereby been forced to "give disarmament a coequal status with national security" (p. 137). The paper proceeds to discuss various theories for "bridging the political chasm" which separates the closed Soviet system from the open American system. Three theories are addressed: scientific, legal and technical.

Broadly characterized, the "scientific approach" throughout the 1950s and 1960s consisted of an "a political" perspective in which the uncertainties of compliance with arms control agreements were sacrificed to the urgent need for the regulation of arms. Legal theorists were "straight forward in their advocacy of outright trust toward Soviet 'intentions'" (p. 239). When this trust was combined with the belief that violations had no military significance anyway, the contribution of legal bridge theories also was to relax American compliance policies. Even technical-legal bridge theories were characterized by acceptance of compliance uncertainties. This originated with the growth of national technical means of verification (optical, infra-red and electronic sensors) and was institutionalized in the SALT I agreement and then later in SALT II. National technical means were widely advertised as the bridge between the open and closed societies, but acceptance of this means of verification brought a concomitant relaxation of verification standards.

Chapter 4 discusses on-site inspection. It reviews chronologically the debates and negotiations on on-site inspection and concludes that optimism about a softening of the Soviet position on on-site inspectionist unwarranted. The paper points out that in the literature on arms control, the term "on-site inspection" has different meanings depending on the object to be inspected, its location and the extent of access to be granted to inspectors. It is thus possible for both the US and USSR to support variants of on-site inspection without agreeing on provisions for monitoring compliance. The author maintains that the demise of on-site inspection occurred with the conclusion of the Limited Test Ban Treaty of 1963. The Treaty confined Soviet explosions to underground sites which were the most difficult of the possible test sites for the Americans to observe. The Treaty did not allow inspections or control posts, aerial reconnaissance or "international mechanisms of enforcement". The author claims that this "marked a critical watershed point in post-war American foreign policy" (p. 180) because subsequent verification provisions would never possess the ability to confirm compliance or prove non-compliance.

Chapter 5 reviews scientific and legal literature to demonstrate that American policy gradually came to accept uncertainty about compliance. Verification theories tended to be less and less demanding as time went by. This flexibility was essential for negotiations on SALT.

Chapter 6 discusses Soviet evasion of American technical monitoring during the SALT II negotiations and ratification process by encrypting telemetry. The chapter also examines the rise of national technical means of verification and scientific-legal theories of "bridging".

Chapter 7 suggests that the failure of technical and legal controls to bridge "the chasm" was the result of differences in the Soviet and American approaches to politics. The Soviet use of "conceptual ambiguity" and deceptiveness in exploiting imprecisely worded agreements combined with American "self-deception" served to complicate the implementation of SALT I and II. By "self-deception" the author means, in part, that the Americans gave greater weight to Soviet statements of intent than to observation of actual behaviour.

Chapter 8 discusses the often misunderstood distinction between verification (which is seen as a guide to arms control decision-making) and intelligence (which is seen as a guide to national security decision-making).

DeSutter concludes that "arms control verification standards that would have been completely unacceptable to the US when equal confidence in compliance was deemed essential have become a reality during the SALT years ..." (p. 488). In order to inform the public about the past record of verification and compliance, the author advocates declassifying the proceedings of the Standing Consultative Commission after three to six months.

A7(A83)

A7(A83)

Proposal Abstract A7(A83)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) On-site inspection - selective
- (c) Remote sensors

3. **Source:**

Morris, Ellis. Soviet Positions on Verification, 1962-1982. In Compliance and Confirmation: Political and Technical Problems in the Verification of Arms Control of Chemical Weapons and Outer Space, pp. 27-36. Edited by H. von Riekhoff. Ottawa: Norman Paterson School of International Affairs, Carleton University, 1986.*

4. **Summary:**

This paper gives a broad overview of the Soviet positions on verification issues over a 20 year period. It looks for consistencies and underlying principles, and considers some Soviet bargaining tactics. It is proposed that these observations might serve to inform future western negotiators on arms control.

Initially, various verification proposals are examined and the Soviet Union's response is duly noted. General and complete disarmament proposals are acceptable to the Soviets so long as there is a total ban on a particular category of weapons. They reject any proposal which requires prior counting of weapons stockpiles, asserting that this constitutes "legalized espionage". With regard to nuclear test ban treaties, the Soviet Union has stated that national technical means of verification alone are sufficient. They have responded favourably to proposals for the use of remote sensors and an international commission to monitor compliance in some instances. Generally speaking, the Soviet Union has rejected proposals which halt production of nuclear weapons without reducing existing stocks, because these would require extensive verification without actually providing for disarmament. Finally, they have agreed to the prohibition of any production of biological weapons, but insist that chemical weapons be subject to a separate form of control. This is due to the difficulty of distinguishing the construction of chemical weapons from the peaceful production of chemicals.

Some general conclusions are drawn concerning the Soviet approach to verification. Their current position is essentially that verification has prevented agreement and has been used as an excuse where there is a lack of political will. The primary fear is that

* Proceedings of a conference held in 1983.

any provision for verification prior to disarmament is simply an excuse for espionage. On-site inspection has consistently been rejected as a threat to sovereignty and national security interests. The Soviet Union, however, appears to be shifting towards an acceptance of on-site inspection, although this may simply be a form of political propaganda. It is recommended that verification measures ought to be negotiated simultaneously with any agreement on disarmament, since this provides for the protection of national interests and simultaneously allows for greater latitude in the bargaining process.

A8(A83)

A8(A83)

Proposal Abstract A8(A83)

1. **Arms Control Problem:**

- (a) Any arms control agreement
- (b) Regional arms control - Antarctica
 - outer space
 - Latin America
 - sea bed
- (c) Biological weapons - production
- (d) Other weapons of mass destruction - ENMOD
 - radiological weapons
- (e) Nuclear weapons - ballistic missiles
 - proliferation
 - partial test ban
 - comprehensive test ban
 - peaceful nuclear explosions
- (f) Chemical weapons - production
- (g) Military budgets
- (h) Conventional weapons - ground forces

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors
- (c) International exchange of information
- (d) International control organization
- (e) On-site inspection - IAEA safeguards
 - selective
 - general

3. **Source:**

Timerbayev, R.M. Verification of Arms Limitation and Disarmament, Mezhdunarodnyye Otnosheniya, 1983.

See also: - Timerbayev, R. Problems of Verification Moscow: Nauka, 1984

- Heckrotte, Warren. "A Soviet View of Verification". Bulletin of the Atomic Scientists (October 1986): 12-15.

4. **Summary:**

This book represents a comprehensive review by a Soviet official of the Soviet position regarding verification.* The Western concept of verification is based on interference in the internal affairs of sovereign states and attempts to establish control over existing armaments (which is equivalent to legalizing reconnaissance). In contrast, the Soviet view maintains that verification should not be detrimental to the security of states and that it is not a goal in itself but rather a subordinate tool for furthering fulfilment of agreements.

* Because of this book's unique nature, this abstract summarizes the author's views in considerable detail.

Several principles underlie this Soviet view; the first being that of proportionality in verification and disarmament. This principle holds that the scope of verification must be precisely commensurate with the nature and scope of the disarmament measure in question. The West ordinarily demands more verification than is necessary. To the extent that verification goes beyond the scope of the disarmament measure, then it is legalized intelligence. The term "adequate verification" is sometimes used to designate this principle of proportionality. Inadequacy of verification can have serious consequences if it produces uncertainty as to complete observance of commitments under an agreement. Experience in arms limitations talks has shown that the practical implementation of this principle of proportionality is far from an easy matter especially when complex technical matters are involved.

A second principle determining the Soviet view on verification is that of non-interference in the internal affairs of states. This involves respect for the sovereignty of states and their equality with respect to the implementation of verification. Verification must be mutual; and it must not damage the security of states. The rights and interests of both opposing social systems - socialism and capitalism - must be taken into full account in the functioning of the verification agencies. Attempts to give verification agencies authority to impose sanctions are aimed at using verification to interfere with a state's internal affairs. The USSR favours separating authority to verify from authority to sanction. The latter should be vested with the United Nations Security Council.

Verification is seen from the Soviet perspective as being only one of the factors assuring observance of disarmament agreements. Moreover, it is not necessarily the main factor, hence some disarmament agreements have no verification provisions. Other factors assuring observance of disarmament agreements include the following:

- the legal principle of pacta sunt servanda;
- the fact that voluntary participation in an agreement means a shared commitment to the objectives of the agreement;
- the moral-political factor or the danger of exposure before world public opinion; (moreover, the population of each country will ensure observance);
- the likelihood that potential violators would prefer to withdraw from a treaty rather than violate it;
- the lack of examples of violations to date;
- the possibility of retaliatory action against violators;
- the unpredictability of the use of the banned weapon (eg. biological weapons); and
- strategic military capabilities. (pp. 23-25).

Verification despite its importance plays a limited role in assuring fulfilment of commitments. It is used when it is impossible or difficult to determine by other means whether states are fulfilling their commitments. This need is determined by the complex material-technical process of disarmament which must be carried out by all parties simultaneously.

International verification and monitoring agencies are definitely needed in some circumstances. Along with the exaggeration of verification's role in assuring fulfillment of agreements and with excessive demands for verification, one also finds the underestimation of the importance of verification. American demands are ordinarily excessive.

The verification issue is used by the US to counteract disarmament. Several examples are given where the US argues that the "technical aspects" of verification must be dealt with before progress can be made. Examples include American proposals regarding zonal inspections during discussions on General and Complete Disarmament, negotiations concerning a nuclear test ban, chemical weapons talks and discussions at the UN regarding reductions of military budgets.

Chapter Two of Timerbayev's book reviews the development of verification systems during the years 1960 to 1980. Despite significant variations in scope, nature, forms, and methods all the verification systems agreed upon during this period are adequate and in full conformity with the basic principles of verification including proportionality of verification and disarmament, the simultaneous effectuation of verification and disarmament, non-interference in the internal affairs of states, and others. Several treaties are reviewed in detail.*

- (1) Antarctic Treaty: Because experience has shown that the provisions of the Treaty are fully observed, the USSR is in no hurry to make inspections under Article VII.
- (2) Outer Space Treaty: This Treaty does not provide the right to observe right to observe objects in Earth orbit since there is no practical need for such verification. During the years which the Treaty has been in force there has not been such a need.
- (3) Treaty of Tlatelolco: The provisions of this Treaty for conducting inspections have not been applied since it has not been necessary.
- (4) Sea Bed Treaty: Since the Treaty does not call for a complete ban on military activities on the seabed there is no unrestricted right of access to installations on the seabed; permission of the state owning the installation is required. Consultation and cooperation are important elements of the verification procedure.
- (5) Biological Weapons Treaty: At the 1980 Review Conference of this Treaty Sweden questioned the adequacy of the Treaty's verification provisions but other countries favoured retaining the existing provisions since the Treaty had been complied with and there had been no need to submit a complaint.
- (6) Environmental Modification (ENMOD) Convention: As part of its verification measures a consultative committee of experts is

* The verification systems which are outlined for each Treaty are not repeated here.

created which is authorized "only to ascertain (but not to investigate) the actual circumstances of the case" (p.45) and submit a report to the UN Secretary General. Experience has shown that the verification measures are "a balanced system" and they are in "full conformity" with the nature of the banned weapons.

- (7) Radiological Weapons Ban: The verification measures of the draft Radiological Weapons (RW) Convention of the US and USSR are similar to those of the ENMOD Convention. Experience confirms the validity of the verification measures of the BW Convention and the ENMOD Convention and therefore of the proposed RW Convention.

- (8) Strategic Arms Limitation between the US and USSR: Verification of these agreements is based on national technical verification means (NTVMs) which have not been defined either in international law or in official government statements. However, "satellites outfitted with photographic and other surveillance equipment are recognized in the literature as the main type of these facilities" (p.48). Photographic reconnaissance satellites have produced a revolution in verification. Existing principles of international law do not forbid the use of satellites for surveillance though "not a single international legal document expresses unequivocal approval of the use of such satellites" (p.49). Certain US/USSR agreements contain commitments not to interfere with NTVMs which include satellites. While these are bilateral agreements, no other state has objected or doubts the legitimacy of NTVMs for verification purposes. In the view of the American government this non-interference with NTVMs, bans the use of "anti-satellite satellites" against satellites used for verification.

The SALT agreements are so worded so that the limitations covered by them take into account the capabilities of NTVMs.

The Permanent Consultative Commission (PCC) was created as part of SALT to implement the objectives of the agreements. At a special session of the PCC in November 1977 the ABM Treaty was reviewed and both countries agreed that the Treaty was being fully observed. Criticisms of the verification provisions of SALT II are not valid since many years of experience in monitoring SALT agreements with NTVMs has confirmed their complete reliability.

- (9) Chemical Weapons Ban: The US has adopted an unrealistic position regarding verification of a CW convention because it is engaged in chemical rearmament. NTVMs such as satellites and indirect verification "based on the analytical processing of the most diverse, generally accessible information covering the development, the production and the stockpiling of chemical agents" (p.56) together with the international measures agreed on in bilateral Soviet/American talks in 1980 (i.e. "the establishment of an international consultative committee, the

voluntary, on-site investigation of the actual circumstances of a suspicious occurrence, and the submission of complaints to the Security Council" (p.56)), all provide adequate certainty about compliance.

- (10) Reduction of Military Budgets: The West has directed discussion of the reduction of military budgets into technical studies including ones on verification. In the 1977 UN Report calling for a standardized international accounting system to simplify comparison of military data and the proposed regular submission of reports "was not linked in any way with practical measures to reduce military outlays". (p.58). Because military budgets are approved by parliament before public scrutiny, there is no need to talk of verification.
- (11) Vienna Talks on Reducing Armed Forces and Weapons in Central Europe: Some agreement has been reached in Vienna on the use of NTVMs supplemented by a commitment not to interfere with those means. Also consultations will be used to resolve doubts. Measures such as verification of the beginning and end of reductions and exchange of information on armed forces would help. The West wants information on force structures which is not needed for reductions. Observers at entry and exit points supplemented by NTVMs could verify withdrawal of foreign troops. Temporary verification points at demobilization sites could verify reductions in national forces. Western demands for a broad system to monitor force levels after reduction are not acceptable because they attempt to verify armaments not disarmament and are an attempt to substitute verification for actual disarmament. Western demands for mandatory on-site inspections regardless of whether doubts about compliance exist, are not in conformity with the size of the proposed reductions and are an attempt to establish a system for monitoring the daily activities of socialist armed forces. Attempts to give "concomitant measures" central and separate importance in the talks are attempts to alter priorities of the talks away from troop reductions. Measures to build trust are intended to dispel apprehensions about military activities without harming the conventional military activities or military organizations of states. The West's proposals in this regard "are contrary to the principle of not impairing the security of the parties" (p.68). The nature of these "concomitant measures" demonstrate that they are intended to legalize the monitoring of daily activities of WP forces and to gather military intelligence. The selective application of these measures to individual nations would violate the principle of reciprocity and equality of participating states. Application of certain measures beyond the geographic boundaries of the reduction zone violates the decision of the preparatory consultations. CSCE type measures to enhance stability and trust could be part of an agreement if they contribute to the fulfilment of troop reductions and are not a separate agreement. They must be in the agreement in the first

stage and apply to all participating states. They should not damage the security of any party and should conform to the extent and nature of the reduction measures. They should only apply in the reduction zone.

Chapter Three of the book focusses on the verification of the non-proliferation of nuclear weapons. Study of the unique verification system of the International Atomic Energy Agency (IAEA) is important since it can serve as a prototype. The author reviews the verification functions of the IAEA which are spelled out in detail in its charter. These provisions "form a thorough base, which has completely passed the test of time, for the practical implementation of verification" of the non-use of peaceful nuclear energy for military purposes (p. 72). The system has limitations, however. It is more a means of determining facts than of avoiding abuses. Its effectiveness depends on the sanctions that can be imposed on violators, which are not automatic under the Charter.

The author then turns to a discussion of the history of the NPT and its provisions. It is pointed out that the USSR struggled persistently for adoption of IAEA safeguards. The 1978 London Agreement on Principles Governing Nuclear Export is also reviewed. In this regard, the Soviet Union along with Sweden and Canada favoured strict verification while others (France, the FRG, Japan and ultimately the US and UK) supported more limited verification measures. The central disagreement concerned whether IAEA control would be extended to all nuclear activities of a recipient nation or whether it would be limited to the materials and equipment supplied. Under the former option, all recipient nations would be treated the same whether or not they were parties to the NPT. The London Agreement eventually adopted the stipulation that safeguards would be applied only to suppliers of items on the Basic List. The USSR accepted this but declared its determination to get agreement on applying standards to all nuclear activities of non-member weapon states when they receive items on the Basic List. It stressed the principle that "total control is an essential condition for assuming effective safeguards capable of preventing the use of nuclear materials, equipment and technology for building nuclear weapons or other nuclear explosive devices" (p.79). The London Agreement is unquestionably positive. Weaknesses in the control of nuclear exports would only play into the hands of capitalistic monopolies which are contributing to the spread of nuclear weapons.

The history and details of IAEA safeguards are next reviewed. The system has its shortcomings. It is applied only to declared peaceful programs to verify that they are not used for military purposes. It is unable to provide certainty that there are no secret military nuclear programs. Despite these weaknesses the system plays a positive role.

In view of the importance of monitoring an agreement which covered vital areas of the activities of many states, it was essential to work out "all of the specific legal and technical standards and procedures for verification in great detail, in order

for the states which would be concluding agreements on safeguards under the treaty with the IAEA to know exactly the extent of the authority and duties of the parties and the substance of the verification measures" (p.84). During negotiations of the NPT safeguards regime the USSR and the socialist states as well as some Western states "succeeded in nullifying efforts to substitute self-monitoring by the states for independent monitoring for the IAEA" (p.86). The USSR also favoured financing the safeguards regime out of the IAEA's administrative budget which derives from mandatory contributions from IAEA members since "a solid financial base is necessary for effective control and it can only be created with a budget made up of mandatory contributions by agency members" (p.86). The standard agreement on NPT safeguards was finalized in 1971 (INFCIRC 153). This agreement is reviewed in some detail by the author. Among the points made is that cooperation between the IAEA and the national registration and control system of a monitored nation is essential to an effective international safeguards system. But the IAEA is not permitted to delegate implementation of measurement and observation measures to the national system since independent verification by the agency inspectors is important.

IAEA inspectors' access to sites is strictly regulated. For example, they do not have access to stages in the technological process which involve commercial or industrial secrets.

The practical application of IAEA safeguards, is next discussed. The USSR and other socialist nations actively supported work on IAEA safeguards since they are an important factor preventing the spread of nuclear weapons. This support includes development projects on improvements, training for inspectors and technical support. In the IAEA the USSR has constantly striven to have all non-nuclear parties to the NPT covered by verification agreements regardless of whether they engaged in nuclear activities.

Agreement by the US, UK and later France to put part of their civilian atomic industry under IAEA safeguards was motivated by their fear that non-nuclear weapon states would delay in signing the NPT and putting their facilities under safeguards. They were afraid that international inspections would reveal trade secrets. The agreement by the US to place some facilities under safeguards was also an attempt to earn political capital. This is of no significance for non-proliferation however since the US's military nuclear program is unrestrained. The USSR announced in June 1982 that as an act of goodwill it would place some of its peaceful nuclear plants under IAEA control. "The USSR was thus responding to the desires of many non-nuclear nations to have not just themselves, but the nuclear states as well place certain of the peaceful nuclear plants under IAEA control within the framework of the regime for non-proliferation of nuclear weapons" (p.97).

The practical functioning of IAEA safeguards for 20 years demonstrates that an effective international verification system can be created and can function effectively in a complex technical area of arms limitation.

Timerbayev in Chapter Four of his book turns to the verification of nuclear weapons testing. The American position in the talks on this subject is "a classic example of artificial manifestation of the problem of international verification for the unseemly purpose of frustrating the achievement of agreements" (p.98). In contrast, the Soviet Union has defended the principle of proportionality between verification measures and specific disarmament measures: "verification is to provide the parties with certainty that the agreements are being observed without encroaching upon vital security interests of the parties of those agreements in the process" (p.98).

The discussion reviews the history of negotiation on this topic from 1958 to 1982 including the Geneva Talks (1958 - 1963), the Moscow Treaty of 1963, the Threshold Test Ban Treaty of 1974, the PNE Treaty of 1976 and the Trilateral Talks of 1977-80. Among the points made is that the system of information exchange and verification established under the PNE Treaty of 1976 are of "exceptional importance" (p.115) because they directly relate to the working out of other arms limitation agreements. It serves as a precedent, for example, for resolving problems such as

"the dependency between the extent of the information exchanged and the measures conducted by the parties; the dependency of the number of verifying personnel upon the nature and the extent of their functions, and the specific parameters agreed upon for this; resolution of the complex problem of equipment use, including the delivery of two sets of equipment and the receiving party's right to select the set to be used for verification purposes; the privileges and immunities of the verifying personnel; protection of the right of ownership to information which may become known to the verifying personnel, and many others" (pp.115-116).

Despite Western claims that this treaty was a major advance in that the USSR accepted on-site inspection, the facts show that the Soviet Union has

"always advocated international verification.... The question is whether international on-site inspection is actually needed or whether the national technical verification means or an exchange of necessary information is adequate for fulfilling the given agreement" (p.116).

Several conclusions are drawn from the review of the history of talks on halting nuclear tests:

- (1) important international agreements limiting nuclear tests have been worked out which include scientifically based verification forms and methods that are adequate to ensure that the agreements are being observed;
- (2) verification is not a barrier to the resolution of the problem of banning nuclear tests; only the necessary political solutions are needed; and
- (3) verification solutions worked out during these talks are of practical importance not only for halting nuclear tests but for other arms restraint measures, especially nuclear arms.

The fifth chapter of the book is entitled "Experience with the Functioning of Control: Results and Prospects". Several attempts at defining "disarmament verification" are examined and found to be unsatisfactory. Because procedures, forms and methods of verification are constantly being developed no hard and fast definition is possible but the classification and analysis of the components of verification ("forms, techniques, means, methods and procedures" (p.126)) on the basis of existing experience can be important and useful.

- (1) National Technical Verification Means (NTVMs): These "may include various technical means, methods, equipment and procedures or various combinations of specific methods as applicable to each specific arms limitation measures" (p.127). For monitoring agreements limiting strategic arms these are mainly "space surveillance means". The stipulation in SALT I that these means are to be used in a way which conforms to generally accepted principles of international law rules out violations of the sovereignty of states, their territorial waters and air space and so forth. NTVMs can be regarded as extremely promising because they are not intrusive; some writers feel that their capabilities in many cases exceed the demands set for SALT II. They are also applicable to other arms limitation measures.
- (2) Exchange of Information: This is an important element of verification. It may be combined with other international verification procedures or be the only international verification measure as in the TTBT.
- (3) Consultations: Consultation procedures are found in almost every disarmament agreement. Some specify a more formalized consultation procedure, for example, the Permanent Consultative Commission of SALT, the Joint Consultative Commission of the PNET, the committee of experts of the ENMOD Convention. Some agreements also have provisions for submission of complaints about violations to the UN Security Council.
- (4) On-site Verification (Inspection): This method has diverse forms. It is extremely complex to work out on-site verification procedures which provide adequate verification while also considering the need to observe the lawful interests of the party being inspected. This method should therefore be used in exceptional cases when other methods cannot provide certainty that commitments are being fulfilled.
- (5) Verification Agencies: Proposals have been made for a general-purpose international verification organization unrelated to any disarmament measure. These proposals did not gain much support because they were not organically connected with a specific arms limitation measure.
- (6) Conferences for Reviewing the Functioning of Arms Limitation Agreements: These are a significant component of verification, permitting the parties to regularly determine how commitments are being fulfilled, how effectively the verification systems

are functioning and what adjustments are necessary. Review conferences have demonstrated their effectiveness.

- (7) Measures to Enhance Trust in the Military Area: While not verification per se they contribute to better understanding of the intentions of parties.
- (8) Technical Organization and Legal Support of Verification: A fairly substantial set of forms, techniques, means, methods and procedures for verification have now been developed, many of which have been practically tested and justified themselves. They demonstrate that even for politically and technically complex problems such as those relating to the establishment of international verification, agreement is possible given the willingness of the parties. In the 60's and 70's the US demonstrated a readiness to reach agreement regarding proper forms of verification. At the end of the 70's and beginning of the 80's this changed to a more rigid stand on verification. The US has demonstrated an intention to revive the concept of control without disarmament which has been totally discredited.

In the conclusion to his book, Timerbayev states that the Soviet Union's line on verification stems from its principled approach to arms limitation. The USSR scrupulously fulfils the commitments it accepts under international treaties and must be certain that other parties do likewise especially respecting disarmament agreements which affect vitally important state security interests. Verification is particularly important in a situation when opposite social and economic systems are in confrontation. As L.I. Brezhnev has said the USSR is "interested in verification no less and perhaps more than the US" (p.135).

International verification should not be a goal in itself or play an independent, self-contained role. Verification is an auxiliary measure subordinate to the main task of disarmament. Verification can not be considered in isolation from specific arms limitation measures to which it must be organically linked. All verification measures must conform to and be commensurate with the nature and extent of disarmament measures. When verification is isolated from disarmament and is applied not to disarmament but to arms, it becomes legalized espionage. Verification must also respect the sovereign right of states and not be a tool for interfering in their internal affairs. It must conform to the principle of equality and identical security. It must also fully assure observance of the agreements.

The history of disarmament talks and the analysis of the principles underlying the position of the US shows that verification is mainly a political not a technical matter and that the attitude toward verification is determined primarily on the basis of political and strategic military interests. The American approach to verification is by its nature contrary to the spirit of disarmament.

The development of technical support for verification especially in the area of space surveillance has contributed considerably to coordination of verification principles. Verification is in a

process of continuous development which makes it impossible to work out ready-made formulas for all solutions. The verification system must take into account the specifics of the weapon being limited or banned as well as political, strategic military, and other factors which determine the parameters of the verification system. Therefore no useful purpose is served by attempts to establish in advance any sort of set forms of verification; rather such attempts only complicate creativity and make it difficult to achieve agreement.

Certain promising elements of control have been developed which may be used in future agreements. These include:

- national technical verification means,
- exchange of information,
- bilateral and multilateral consultations,
- establishment of agencies for consultations,
- procedure for submitting complaints to the UN Security Council,
- on-site inspections,
- use of verification agencies, and
- periodic conferences for reviewing agreements.

Experience with verifying specific agreements indicates that when there is the political will to achieve agreement, generally acceptable solutions can be found to the complex problems pertaining to sensitive material and technical aspects of the security of states.

Of basic importance because of their non-intrusive nature are national technical verification means. Another verification means with great promise is the exchange of information between parties as well as the submission of appropriate information to an international center for the collection and processing of data. Bolder use of consultations between parties is justified on the basis of present experience.

The importance of control and its role in assuring observance of agreements will grow as military equipment develop and become more complex. This applies primarily to national technical verification means which will be of decisive importance to future verification. As the extent of disarmament increases more extensive application of international forms of verification will be discussed, depending on the level of trust among states.

A8.1(A82)

A8.1(A82)

Proposal Abstract A8.1(A82)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors
- (c) Complaints procedure - consultation and cooperation
- referral to Security Council
- (d) International exchange of information
- (e) On-site inspection - selective
- IAEA safeguards
- (f) International control organization

3. **Source:**

Zheleznov, R. "Monitoring Arms Limitation Measures". International Affairs (Moscow), no.7 (July 1982): 75-84.

4. **Summary:**

The author describes the Soviet approach to arms control verification and reviews the verification procedures accepted for past arms control agreements. He charges that the United States has tried to use the problem of control in order to delay or disrupt negotiations on mutually acceptable accords. If control (verification) is to contribute toward the fulfilment of disarmament agreements, its volume should correspond to the practical measures in the field of disarmament. If the volume of control, the competence of the control body or the methods of inspection, etc., extend beyond what is objectively needed to observe the fulfilment of the agreement, control turns into legalized espionage.

Control over disarmament must proceed from such principles of international law as sovereign equality and noninterference in the internal affairs of a state. Undiminished security of the states and strict observance of equality and equal security are indispensable in implementing control. Control should only be used when it is difficult to establish by other means whether states are honouring their agreements. There exist many other factors apart from verification that influence the fulfilment of agreements including the mutual interest of the participants in making agreements effective, the possibility of retaliatory action and reprisals, and the danger of exposure in the eyes of their own people and of world public opinion.

In the 1960s and 1970s, detente contributed toward greater confidence between states thus creating additional possibilities for the solution of concrete verification problems in keeping with the interests of states and without jeopardizing their security. In territories and regions outside any national jurisdiction and free of

banned weapons, control mechanisms were created allowing wide discretion in monitoring the fulfilment of commitments undertaken by states. The international agreements containing such control provisions include the Antarctic Treaty, the Outer Space Treaty and the Treaty of Tlatelolco.

National technical means of control should form the basis of any international verification system. National technical means are beneficially supplemented by consultations between the parties. Of major significance in realizing control are exchanges of information among the parties to agreements on request or on a regular basis, making information available to a control body or data collecting centre, and bilateral or multilateral consultations if unclear phenomena arise. Special bodies could be set up for consultations or to prepare expert studies. The practice of lodging complaints with the Security Council against states suspected of violating international agreements can also be effective. To examine such violations, on-site inspection could be used, either on a voluntary basis or in accordance with clear terms and criteria established under the agreement. However, this method of control is acceptable only in exceptional cases when all other methods have failed to yield satisfactory evidence. Effective control over disarmament measures can be carried out by special verification bodies created under agreements or by international organizations charged with control functions by the parties to the agreement, such as the IAEA's role in verification of the Non-Proliferation Treaty.

A9(A83)

A9(A83)

Proposal Abstract A9(A83)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors - satellites

3. **Source:**

Towle, Philip. Arms Control in East-West Relations. In Compliance and Confirmation: Political and Technical Problems in the Verification of Arms Control of Chemical Weapons and Outer Space, pp. 17-20. Edited by H. von Riekhoff. Ottawa: Norman Paterson School of International Affairs, Carleton University, 1986.*

4. **Summary:**

This paper provides some general insights into the arms control process and the task of verification over the past six decades. Selected breaches are discussed as evidence of recurring tendencies. The passage of the Soviet aircraft carrier Kiev through the Dardanelles in 1976, the alleged manufacture of biological weapons at Sverdlovsk in 1979, and the 1981 Israeli attack on the French-built nuclear reactor in Iraq are discussed briefly. It is interesting to note the variety of responses to such breaches. A comparison of the Kiev incident and the Israeli bombing reveals a paradoxical situation wherein the former, a serious proven breach, only aroused 'faint murmurs on disapproval', whereas the bombing of the Iraqi nuclear reactor led to an extreme reaction although no international agreement had been breached. This demonstrates the range of possible responses, and the author discusses some of the factors which have determined various nation's responses. Central among these is a well-publicized American reluctance to reveal Soviet violations of the SALT I treaty in the interests of promoting detente. Recently, the US has become more vocal about such breaches. The American request for Soviet confirmation of the Sverdlovsk incident indicates that the US has become increasingly cautious in assessing Soviet compliance.

An important observation is made regarding verification capabilities. Recently, the limitations of satellites in providing adequate verification have been recognized, in contrast to the previous belief that satellites had solved most verification problems. The assessment of breaches has been complicated by the technical nature of the evidence and a political climate which breeds suspicion on all sides. Finally, there is no consensus on how to deal with the situation, should a breach occur.

* Proceedings of a conference held in 1983.

A10(G83)

A10(G83)

Proposal Abstract A10(G83)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
- (d) International exchange of information

3. Source:

United States. Arms Control and Disarmament Agency. Annual Report: 1982. Washington: US Government Printing Office, April 1983.

See also: - United States. Arms Control and Disarmament Agency. Annual Report: 1983. Washington: US Government Printing Office, March 1984.

- United States. Arms Control and Disarmament Agency. Annual Report: 1984. Washington: US Government Printing Office, April 1985. (Abstract A20(G85)).

4. Summary:

A detailed description of the nature and purpose of verification is provided in the 1982 report, with a particular emphasis on its priority in terms of resource allocation. To date, verification has proved to be a troublesome task and national technical means are not in themselves sufficient to verify all agreements; "such compliance as there is, is assured mainly by the threat of retaliation" (p. 52). The purposes that verification must serve are as follows: it should detect and deter violations, build domestic and international confidence, describe the degree of verifiability of a given treaty, and convey data relevant to possible non-compliance (pp. 52-53). Verification must also look to attendant concerns about national security and a nation's evaluation of the 'precedential nature' of verification, meaning that the relative importance of verification as a means of preserving national security must be ascertained. Finally, an emphasis on verification will ensure that sufficient resources are allocated for intelligence purposes, and a coherent methodology can be developed for the investigation of verification and compliance issues.

National technical means are the principal method of verification - this may be greatly assisted through the development of cooperative measures which require joint action by the Soviet Union and the US. The latter consists of data exchange, prior notification of events, and on-site inspection, all of which would be useful in verifying more recent agreements. The INF and START proposals in particular will pose problems for verification by requiring that the range, type, throw-weight, and total number of missiles and warheads be distinguished.

A11(A84)

A11(A84)

Proposal Abstract A11(A84)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Goldblat, Jozef. "Charges of Treaty Violations". Bulletin of the Atomic Scientists 40, no.5 (May, 1984): 33-36.
4. **Summary:**

This article basically recounts the allegations of violations in arms control agreements which have been made by both the Soviet Union and the United States. East-West tensions have been exacerbated and negotiations have been interrupted or halted by these widely publicized claims.

In many instances, the alleged breach is founded on 'ambiguous evidence', or are only 'probable' violations based on vague notions about the intent of an agreement. Two categories or sorts of breaches are distinguished: "those relating to the general spirit of the agreements, and those dealing with specific provisions" (p. 36). It is noted that violations of the former are insubstantial insofar as they are based on subjective perceptions of treaty obligations. Even those violations which purportedly contravene specific provisions are "vague and conjectural. In some cases, they result from a lack of sufficiently precise definitions" (p. 36). Problems may arise where the language is complex or ambiguous, or in those instances where treaties have been accepted but not ratified. Finally, it is indicated that many of these supposed breaches are quite inconsequential. "In at least two cases, controversies which were practically resolved have been dug out, it would appear, only to inflate the list of grievances" (p. 36). It is concluded that most allegations have been made far too lightly, and the fact that consultative bodies have not "been exhaustively used testifies to the propagandistic nature of both US and Soviet rectimations" (p. 36).

A12(A84)

A12(A84)

Proposal Abstract A12(A84)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
 - (a) Verification - general
 - (b) Complaints procedure - consultative commission
3. **Source:**
Gray, Colin S. "Moscow is Cheating". Foreign Policy 56 (Fall 1984): 141-152.
4. **Summary:**

It is asserted that the incidence of Soviet violations is now beyond question, as demonstrated in two studies conducted by the Reagan Administration which give the Soviets the benefit of the doubt. To date, the US has not responded to Soviet violations, and American inactivity has effectively condoned and reinforced such activities. Seven specific incidents are reported as cases of probable Soviet non-compliance. Gray cites from the 23 January 1984 report to Congress of President Reagan:

The Soviet Union is violating the Geneva Protocol on Chemical Weapons, the Biological Weapons Convention, the Helsinki Final Act, and two provisions of SALT II: telemetry encryption and a rule concerning ICBM modernization. In addition, we have determined that the Soviet Union has almost certainly violated the ABM Treaty, probably violated the SALT II limit on new types, probably violated the SS-16 deployment prohibition of SALT II, and is likely to have violated the nuclear yield limit of the Threshold Test Ban Treaty.

The issue is not the veracity of such charges or whether the Soviet Union has gained military advantages; it is simply imperative that the US defend its credibility both to the American people and to the Soviet Union, regardless of the circumstances.

Verification is not terribly important under these circumstances, since rigid standards of proof need not apply. An arms control agreement is only a contract, and does not require the defence of the weak against the strong, thus there is no reason to apply stringent evidentiary requirements. There are also substantial obstacles to effective monitoring, so that the verification of compliance will always be a matter of judgement based on incomplete evidence.

In conclusion, the US Administration's previous policy of appeasement which sought to soothe East-West tensions is criticized. This approach disproves US intent by showing that US political will may be circumvented. It also hurts national security by allowing the Soviets to gain real military advantages. The Standing Consultative

Commission (SCC) has also contributed to this loss of security, since its secrecy rule gives a unilateral advantage to the violating party. It is recommended that the US make a public statement to the effect that it will no longer accept violations. The government should then appoint a bipartisan advisory body, and above all, be firmly prepared to withdraw from agreements if necessary.

A13(A84)

A13(A84)

Proposal Abstract A13(A84)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors - satellites
- (c) On-site inspection - selective

3. **Source:**

Krepon, Michael. Arms Control: Verification and Compliance. New York: Foreign Policy Association, 1984.

4. **Summary:**

This booklet provides an introduction to the subject of verification for a "nonexpert" audience. It reviews and discusses concepts of verification, Soviet views on verification, treaty compliance and compliance diplomacy. The author makes frequent reference to arms control negotiations to illustrate points.

Satellite observation by photoreconnaissance satellites is capable of many things, but not such "magical" feats as reading numbers on license plates or seeing through buildings. Cloud cover prevents the use of photographic satellites, but this can be overcome with the use of radar imaging. Thermal infra-red scanners can also provide pictures based on the heat emitted from objects. Multispectral photography can allow photo-interpreters to distinguish between true vegetation and camouflage by shooting pictures simultaneously in different regions of the electromagnetic spectrum.

Counting rules can be of great use for verification, particularly for systems which are difficult to verify such as cruise missiles. The SALT II treaty counted all aircraft of a type upon which air-launched cruise missiles (ALCMs) had been tested or deployed under agreed ceilings. This could be extended to establish counting rules for the number of ALCMs per aircraft and the number of aircraft of that type. This method could also be applied to sea-launched cruise missiles, "although the results would be even less precise" (p.26). Counting rules and cooperative measures could also be of use for verifying limits on mobile ICBMs.

Future agreements should be limited in scope to deployed forces. Production rates and inventory levels are not likely to change the military balance or perceptions of the balance. Verification of limitations in these areas would be difficult. The author asserts that:

even with on-site inspections, the United States will have less confidence in its ability to monitor Soviet compliance with agreements limiting missile production and inventories than with agreements like the SALT I and II accords. Moreover,

inspections of missile production and storage facilities will be extremely difficult for both sides to accept (p. 27). The risks of including hard-to-verify systems in an agreement must be weighed against excluding them and producing a less meaningful agreement.

A14(A84)

A14(A84)

Proposal Abstract A14(A84)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Complaints procedure - consultative commission
- (c) Remote sensors
- (d) On-site inspection - selective

3. **Source:**

Krepon, Michael. "Both Sides Are Hedging". Foreign Policy 56 (Fall 1984): 153-172.

4. **Summary:**

Compliance with arms control agreements is ultimately a political issue, and cannot be decided solely on the basis of technical evidence. Both sides will strive for permissibility in agreements and no treaty can cover every eventuality, so that compliance problems will always arise. Consequently, arms control agreements must be founded on a measure of trust and their success demands "compliance diplomacy" as well.

The debate over verification has become ritualistic in its approach to monitoring requirements and the significance of non-compliance. There are two separate approaches. The first stresses flexibility; it weighs the probability of cheating against the probability of detection, and seeks to prevent only those violations which are militarily significant. This approach depends on the self-interest and common intention of both parties as incentives for compliance. The second of these two approaches does not rely on voluntary Soviet compliance, since any positive incentives might be offset by the desire for military superiority and a penchant for deception and concealment. Therefore, any arms control agreement must contain precise, unambiguous language, highly intrusive verification requirements, and an array of sanctions and unilateral actions should violations occur.

The response to compliance problems has varied with the change in administration. Reagan is now pressing for a more vehement response to Soviet violations. Previously, Nixon, Ford and Carter all sought to redefine the terms of agreement rather than "prosecute" where violations did occur. Now, "critics prefer a prosecutory rather than a problem solving approach in the SCC" (p. 158). It is felt that the Soviets have gained significant military advantages where violations have been overlooked in the past. These differences show how the perceived threat of Soviet non-compliance depends as much on the prior assumptions of the observer as well as the weight of evidence.

This deterioration in the arms control process begins with hedging on both sides, as nations take actions that are not expressly prohibited yet tend to undermine the purpose of the treaty. At best, such actions tend to reduce trust on both sides, and at worst, may render a treaty inoperative where it no longer protects the national security of the disadvantaged side. Presently, incidences of "hedging" and non-compliance have accumulated to the extent that the purpose of negotiations and the basic intentions of negotiating parties are being challenged. "The process of encroachment on agreed limitations is not as blatant as ardent SALT critics... contend, but its damaging cumulative political impact is undeniable" (p. 165).

Solutions to compliance problems are scarce. Improvements in the national technical means of verification alone will not suffice, and may even increase the likelihood of false alarms. Furthermore, better monitoring capabilities will be of little use where treaty provisions have been poorly or loosely defined. "More intrusive verification provisions are over-rated as verification aids" (p. 167), and on-site inspection may help, but it is not a panacea. Instead, negotiators should simply avoid provisions which are difficult to verify, and should use precise and simple language. Those agreements which garner much public support will rarely provoke disputes over compliance, since the benefits of the treaty will outweigh the costs of violation.

It is concluded that "the essential precondition for success is that both sides believe it is in their interests to maintain the viability of previous agreements" (p. 168). Confidence in arms control agreements must be restored; this requires of the Soviet Union increased sensitivity to treaty constraints and greater compromise on the issue of verification. The US in turn should seek explanations rather than publicizing their suspicions about Soviet activities.

A15(A84)

A15(A84)

Proposal Abstract A15(A84)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Meyer, Stephen M. "Verification and Risk in Arms Control". International Security 8, no. 4 (1984): 111-126.
4. **Summary:**

The paper discusses the view that provisions of an arms control treaty must be 100% verifiable to be in the US national interest. In addition, on a broader level, it attempts to develop a better understanding of the relationship between arms control verification and risks to US security.

"Monitoring" is first distinguished from "verification". The former refers to a technical process intended "to detect, identify and 'measure' developments and activities of interest" (p. 112) and is an intelligence function largely independent of arms control. In contrast, verification is "a process through which judgements are made to 'certify' compliance with arms control treaty provisions" (p. 112). Verification is subjective, judgemental and highly sensitive to political distortion with "hard" data from monitoring being only one input. Verification does not involve the substantiation of absolute truth but rather is a political act.

"Early detection" is similarly distinguished from "early warning". The former is "the ability of one's monitoring systems to observe, identify, and record reliably, defense-related developments, practices, and activities before they can be converted into militarily significant capabilities" (p. 113). Early warning, on the other hand, involves "the recognition that the data resulting from early detection requires follow-up action" (p. 114). Data from monitoring systems are only one input into any decision on early warning; political factors are also important. "Early detection will not necessarily produce early warning" (p. 115).

Early detection requires reliable observation and identification which means maximizing the likelihood of extracting a true signal from background noise and minimizing the likelihood that background noise will be misinterpreted as a true signal. If a monitoring system identifies something when it does not exist then a problem of "false alarm" arises. A fundamental property of any monitoring system is that as detection sensitivity increases the false alarm rate rises, particularly when numerous man-made or natural activities or objects have signatures similar to the item being monitored. Deception and concealment aggravate the problem.

The extent to which the verification process can tolerate false (detection) alarms depends on the frequency with which false detection is likely to result in false warning (which means reaching erroneous conclusions that something is wrong).

Increasing the sensitivity of monitoring systems in the hope of improved detection or pushing the verification process into premature analyses, may "actually lower the prospects for early warning" (p. 117) because the conditioning effects of prior false alarms and warnings could result in ignoring valid early detection signals thereby jeopardizing early warning. Hence the risks posed by false alarms and warnings may be greater than the risk posed by failures of early detection. There are "trade-offs between maximizing prospects for early warning and minimizing the likelihood of false warnings" (p. 117).

"Uncertainty" should not be equated with "risk". The former is "a characteristic of monitoring systems and is a measure of their ability to provide data of unambiguous meaning" (p. 118). Risk is a subjective measure of one's perception of the consequences involved in some decision. Equating uncertainty and risk distorts discussions of national security because it suggests that situations of greater uncertainty hold more risk (less security) or, conversely, that greater certainty implies less risk (more security).

The standards of adequate verification vary with time and the political climate. After giving several examples, the author suggests that "in evaluating the verifiability of arms control treaty provisions, it is important to determine whether monitoring is expected to prove compliance against the presumption of violation or prove violation against the presumption of compliance" (p. 122).

Because in verification systems detection is almost always easier than measurement and produces less uncertainty, outright bans on weapons systems or specific activities are preferable to limitations (p. 113).

The military value of some types of arms control provisions "can be undercut if the desire for very high confidence (low uncertainty) monitoring is allowed to dictate limitation levels" (p. 125). Thus, "the pursuit of certainty can increase risk".

In conclusion, the author suggests that arms control must contend with both militarily significant cheating and politically significant cheating. Militarily insignificant cheating only has political significance in the context of US domestic politics. Furthermore, a given set of monitoring capabilities which cannot provide early detection for verification also cannot provide early detection for revising US military posture. Arms control like force planning must be thought of and evaluated as a means of enhancing national security. The verification of arms control treaties is not a fixed measure of objective quality; it will change with the political environment. The issue of verification and the risks of arms control should be evaluated in terms of whether the military and political threat posed by undetected cheating is greater than that posed by unconstrained military activity.

A15.1(A85)

A15.1(A85)

Proposal Abstract A15.1(A85)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
Verification - general
3. **Source:**
Brams, Stephen J. Superpower Games: Applying Game Theory to Superpower Conflict. New Haven: Yale University Press, 1985.
4. **Summary:**

In this book the author attempts to show how game theory can help elucidate the rational basis of different aspects of the superpower conflict. One of the kinds of conflict analyzed are "verification games" in which one side tries to hide the truth and the other seeks to discover it.

The verification problem involves impediments that may undermine one side's ability to determine compliance with arms control provisions and the correspondence between statements and observed actions of the other side. "Its solution lies in formulating strategies that enable each side to ensure that it makes optimal use of its monitoring capabilities in the face of these impediments" (p. 117). By solution the author does not mean specific safeguards against being deceived, but "general principles for dealing with problems of detecting truth, based on an analysis of optimal strategies in games wherein the truth may be fugitive" (p. 117). To elucidate these principles the author models the verification problem using a simple two-person, nonconstant-sum game of imperfect information played by a "signaler" and a "detector".

Based on the analysis of this game, Brams concludes that the optimal strategy for the detector involves not always believing his detection equipment and responding accordingly (ie. not following a "tit-for-tat" strategy), even if his equipment is fairly reliable. He concludes that "... all statements that are detected to be lies should be disbelieved, but statements that are thought to be truthful should, on occasion, also be disbelieved to offer a greater inducement for truthful behaviour. This strange result held whether the detector sought to guarantee himself a certain minimum, whatever the signaler did, or he acted to induce the signaler to be truthful in an effort to do still better" (p. 151).

The analysis also indicated that it is optional for the signaler to be almost always truthful, so as to induce the detector to believe, regardless of what he detected. "In other words, the signaler can make it advantageous for the detector to abandon a policy of conditional belief and make his belief unconditional, but

this requires largely honest behaviour on the part of the signaler to make this kind of unquestioning belief (or trust) rational" (p. 151).

The most important lesson from the analysis, according to the author, is probably that inducement strategies may lead to higher payoffs for both sides than guarantee strategies. Brams suggests that both superpowers, therefore, should seek not simply to set a floor under their expected payoffs "but instead to try to influence the other side - either to be mostly truthful (signaler) or to believe generally the signals it receives (detector)" (p. 152).

A15.2(A85)

A15.2(A85)

Proposal Abstract A15.2(A85)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

Feer, Frederic S. "The Verification Problem: What It Is and What Could Be Done About It". Journal of Strategic Studies 8, no. 2 (June 1985): 145-162.

4. Summary:

The author's purpose is to discuss the processes and techniques of monitoring and verifying compliance with arms control agreements. He includes a primer on the intelligence process and its relevance to arms control verification.

Since good faith cannot be assumed in regard to compliance with arms control agreements, three questions arise, which are intelligence questions:

- (1) What kinds of information is needed to be sure that we know what the other side is doing?
- (2) How do we obtain it?
- (3) How can we be sure that the information we receive is a proper basis for decision-making?

Intelligence is simply information gathered to serve a particular purpose; what is unique about intelligence lies in the resources used to gather the data and the consequence if accurate information is not gathered, analyzed and disseminated. Intelligence concerns itself with discovering what others wish to hide.

Resources devoted to intelligence are not infinite and must be measured against the variety and magnitude of information needs. Distributing these available resources constitutes a major problem.

The intelligence cycle has at least five distinct stages which are mutually supportive and interconnected:

- (1) requirements development which is concerned with analyzing needs for information and available means of collection;
- (2) collection activities which operate the organization and equipment essential to effective and timely information acquisition;
- (3) processing of the raw information collected;
- (4) analysis which involves assembling relevant information and applying the best techniques to extract from it an accurate picture of reality; and
- (5) dissemination of the analysis to the intelligence users.

Much of the process of information gathering for verification purposes must be secret because if one side knew how the other collected information about it, they could better hide any efforts at cheating. Secrecy is vital to both the quality of knowledge about arms control and the confidence of any government in the arms control process. One problem with this necessity for secrecy is that it makes complaints more difficult to make without telling the other side too much about how the data related to the complaint was collected.

Verification is defined by Feer as "the process of ascertaining the extent to which the parties to a treaty are abiding by its terms and as such, to one extent or another, is an element of all treaties". (p.148) There are two parts to the problem of verifying compliance:

- (1) monitoring, which is the function of collecting, analyzing and reporting data on the activities of the parties; and
- (2) verification, or the process of determining whether the parties are complying with their obligations.

The term "verification" encompasses "monitoring". The latter is a technical activity while the former is an interpretive activity involving interpretations about the evidence and about the obligations in an agreement. The verification process as a whole is the responsibility of the national political authority not its intelligence agencies. Verification must provide assurances of compliance in a manner enabling the parties to protect their interests by allowing the victim to take offsetting action in good time.

All adults find it necessary to act as though indirect knowledge about the world around them is the same as direct experience. But direct evidence is usually preferred to indirect learning. At least part of the appeal of on-site inspection results from this preference. Verification deals with matters which sovereign states treat as their most sensitive secrets and about which they seek to prevent others acquiring both direct and indirect information.

While the US has a large and capable intelligence system, there are two problems:

- (1) past intelligence failures; and
- (2) whether the existing intelligence system is the best to resolve controversy around verification.

Fifteen steps are involved in the intelligence process:

- (1) the question;
- (2) submission of the question to intelligence agencies;
- (3) acceptance of the question as guidance for collection activity;
- (4) collection activity;
- (5) target activity or the probability that the activity of interest is occurring when the collection action is taken;
- (6) proximity of the collector to the target activity;
- (7) operation or the probability that the collector will operate properly;

- (8) natural interference;
- (9) deliberate interference;
- (10) transmission;
- (11) processing;
- (12) dissemination;
- (13) recognition of the relevance of the raw data;
- (14) recall and relevance;
- (15) requirement revised.

Each of the above steps can be assigned a probability of occurrence. Each step is dependent on the preceding one, meaning that near perfection is needed to assure an appreciable probability that the entire process will produce useful intelligence. The author lists and analyzes seven illustrative cases involving different sets of assumed probabilities for each of the fifteen steps. Even small changes in each item can have substantial changes in the overall probability for the process.

It is sometimes argued that cooperative measures such as on-site inspection can reduce the burden on independent verification procedures. While some problems can be ameliorated or eliminated by rapid and numerous on-site inspections, this method is no cure-all.

Another point is that the terms of an agreement define the task confronting a cheater. "If you tell a determined cheater what you want to see, you should not be reassured because you see it" (p. 158). The proper response to this problem is careful attention to the mix of independent intelligence channels and constant skepticism about the information gathered and its analysis.

The real problem about verification is not whether suspicious or banned behaviour can be detected, but what to do about it once detected. Arms control agreements are verifiable. When possible violations are detected, however, the technical process of verification is subordinated to more fundamental political questions. If the means to cope with the political problem can not be found, this is a serious problem which may make arms control unacceptable. But such rejection of arms control should not occur on the false grounds of unverifiability. Nor should the fact the political problem remains unresolved mean deferring improvements in monitoring and verification performance. The beginning of a method of supporting arms control is a reexamination of the probabilities assigned each of the fifteen steps in the intelligence process and the recognition that the poor performance applies only to a single iteration of the intelligence cycle. The probability of success increases with each iteration and, therefore, time is a key factor. The more dynamic the intelligence cycle, the greater are the opportunities to acquire useful data and the greater are the opportunities that cheaters will make a mistake. To best use the time it takes a violation to occur, is to enhance the dynamism of the intelligence collection and analysis process. This requires a stock of good questions and insights to direct the allocation of intelligence resources.

The usual criteria for adequacy of verification is the detection of a violation before it becomes "militarily significant". But this formulation masks the problem of what to do with the time after detection of the violation, before it becomes militarily significant. In essence the question becomes:

how frequently must how many questions (requirements) be distributed across how many independent sources of information over how long a period for the US government and people to be assured that we will detect any cheating not only before it becomes militarily significant, but also in sufficient time for the US to debate, choose and implement a countering course of action? (p. 160).

There are too many variables involved in this question to provide a real answer to this question.

A16(A85)

A16(A85)

Proposal Abstract A16(A85)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
 - (a) Verification - general
 - (b) Remote sensors - satellite
 - (c) On-site inspection - selective
3. **Source:**
Krass, Allan S. "The Soviet View of Verification". In Verification and Arms Control, pp. 37-62. Edited by William C. Potter. Lexington, Mass., D.C. Heath and Co., 1985
4. **Summary:**
Krass asserts that, contrary to popular belief, verification is as much an issue for the Soviet Union as it is for the United States. However, approaches to the subject differ. This article contrasts the American and Soviet approaches to verification. The Soviets prefer to agree on basic principles before negotiating details and assume that parties entering into an agreement intend to honour it, not violate it. The article discusses Soviet acceptance of satellite monitoring for arms control as of 1963 and the traditional Soviet skepticism of the value of on-site inspection. The Soviet Union does not share with the United States the problem of developing domestic support for any arms control agreement and the author faults the Soviets for not being sensitive to this problem. They can also be criticized for trying to divorce verification activities from the broader category of intelligence gathering when there is an important link between them.

A16.1(A85)

A16.1(A85)

Proposal Abstract A16.1(A85)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors - satellites
 - radar
 - ELINT
- (c) Seismic sensors
- (d) On-site inspection - IAEA safeguards
 - selective

3. Source:

Krass, Allan S. Verification: How Much Is Enough?. Stockholm: Stockholm International Peace Research Institute, 1985.

4. Summary:*

Two sets of issues are dealt with in this book. First, verification technologies are described including photoreconnaissance satellites; infra-red imaging; phased-array, over-the-horizon and synthetic aperture radars; image restoration and enhancement; seismic detectors; nuclear explosion detectors; electronic reconnaissance and signal detection and analysis; and nuclear safeguards. The author discusses what these technologies can currently do and what they may be capable of in the future.

The second set of issues are political ones. The author examines:

- the similarities and differences between US and Soviet approaches to verification,
- the interests and activities of the other states,
- the roles of domestic and bureaucratic politics,
- the criteria for a workable standard of adequacy,
- the role of trust in verification,
- the legitimacy and non-legitimacy of different forms of verification,
- the appropriate roles for cooperative measures and on-site inspection,
- the problems and prospects for making the verification process more international in both scope and participation.

Among the author's conclusions are:

- (1) Several significant arms control measures can already be adequately verified including a CTB, an ASAT ban and conventional force reductions in Europe.

* This book was received too late for a detailed summary to be prepared. This summary is based on the publisher's press release.

- (2) A workable standard for verification adequacy must derive from the ability to detect militarily significant violations in time to respond effectively. It is not necessary to detect all violations.
- (3) As modern weapons become smaller, more mobile and more concealable, there is a serious danger that the ability to hide these weapons will outstrip the ability to find them, despite increasing capability of verification technology.
- (4) The value of on-site inspection has been exaggerated. It has a limited role to play, but in its more extreme forms it is both technically unworkable and politically utopian.

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A17(A85)

A17(A85)

Proposal Abstract A17(A85)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective

3. **Source:**

Lowenthal, Mark M. "Current United States Approaches to Verification". In A Proxy for Trust: Views on the Verification Issue in Arms Control and Disarmament Negotiations. pp. 25-32. Edited by John O'Manique. Ottawa: Norman Paterson School of International Affairs, Carleton University, April 1985.

4. **Summary:**

This article points out that there is a new and different emphasis on verification in the Reagan Administration which is characterized by five basic goals. These are:

- (1) the maintenance of national security;
- (2) a stable strategic relationship with the USSR;
- (3) the avoidance of potential verification problems in arms control agreements;
- (4) demonstrable compliance; and
- (5) the demonstrable resolution of non-compliance.

The specific concerns of the executive, Congress, and the general public with regard to these goals are then elucidated. The Reagan executive looks to a new standard of 'effective' verification which is more stringent than the previous requirement for adequate verification, and this change has led to an increased willingness to publicly challenge Soviet compliance. The attitude of Congress dovetails with this approach, insofar as there is a growing skepticism of Soviet behaviour and a major concern with Congressional oversight of the verification process. Finally, public views may be distinguished according to the level of information that they possess. There is an arms control elite which espouses one of two approaches - either the Soviets cannot be trusted, or their behaviour may be rationalized in the interests of arms control. Those who are not informed take a more contradictory line which simultaneously supports progress in arms control and yet displays a high level of skepticism towards Soviet trustworthiness.

Some issues which are likely to be contentious are then highlighted. Counting methods will pose problems for verification as launchers are no longer considered to be a sound indicator of military strength. The mobility of new missiles also makes the task of verification more difficult, and on-site inspection will become

more central to the debate. Finally, Soviet compliance and the means of dealing with violations will be emphasized.

In conclusion, it is asserted that the verification issue will be more difficult to resolve as it becomes more politicized. The task of verification will also be complicated by the development of mobile weapons systems, smaller weapons and weapons with a dual capability. Lastly, Soviet behaviour has become an integral factor, both in its effect on the attitude of the US Administration and on the negotiations themselves.

A18(A85)

A18(A85)

Proposal Abstract A18(A85)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors - satellite

3. **Source:**

MacIntosh, James. "Future Verification Constraints". In A Proxy for Trust: Views on the Verification Issue in Arms Control and Disarmament Negotiations, pp. 111-126. Edited by John O'Manique. Ottawa: Norman Paterson School of International Affairs, Carleton University, April 1985.

4. **Summary:**

Some constraints on verification that effectively limit monitoring capabilities are enumerated. They are both technical and non-technical in nature, and are divided as follows: (1) technical, (2) manpower, (3) economic, (4) doctrinal, and (5) cognitive constraints. They are not easily distinguished from one another, and "appear to possess a significant synergy which makes their combined effects all the more difficult to remedy" (p.112).

Each of these limits is then described in detail. Technical constraints are the most fundamental practical limits on monitoring capability, and assessment may be complicated here by the fact that the outer limits of technology will always be subject to certain degrading factors. For example, there are definite restrictions on the levels of resolution attainable in photoreconnaissance, and "the capacity is still insufficient to see everything, everywhere" (p. 113). There are also fundamental limitations on other national technical means technologies - these are the practical limits which degrade the 'absolute best' of any system.

Manpower may also impose limits on verification capabilities, since every advance in software requires the concomitant development of skilled manpower. All data must be analyzed with utmost care by skilled individuals, and "may require virtually instantaneous collection and evaluation" (p. 114). Artificial intelligence may alleviate such demands, but the probability of computer error may increase. Finally, cognitive limits may prevent the correct evaluation of data in some instances.

A third limit is that imposed by economic constraints. A full range of possible surveillance mechanisms would be very expensive and potentially limitless. They also have little appeal in the scramble for funding, and expenditures will be limited according to a lower level of verification that is deemed sufficient.

Military doctrine may constrain verification by emphasizing strategies which enhance the ability to carry out a surprise attack. "High states of readiness, rapid reaction and offensive counter-measures place exceptional strains on the capacity of negotiators to devise effective arms control measures that can successfully address fears of surprise attack" (p. 118). Currently, military officials on both sides are unwilling to sacrifice their manoeuvre-oriented strategies in the interests of verification and arms control.

Finally, cognitive constraints are specified as one of the most substantial obstacles to verification. This means that decision-making will always be distorted by a high degree of subjectivity and imperfect perception, especially in situations which are characterized by a high degree of uncertainty. Judgment may be impaired by a preference for concrete information which parallels the observer's own experience, or by faulty inferences arising from the order, consistency, or context of the data.

A19(A85)

A19(A85)

Proposal Abstract A19(A85)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Regional arms control - Europe

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors

3. Source:

Peters, Ingo. "Verification in European Arms Control: Strategies and Prospects for the Future". In A Proxy for Trust: Views On the Verification Issue in Arms Control and Disarmament Negotiations, pp. 101-110. Edited by John O'Manique. Ottawa: Norman Paterson School of International Affairs, Carleton University, April 1985.

4. Summary:

This essay discusses the prospects for arms control and verification in Europe. It is noted that there must be a trade-off between the stringency of verification and the likelihood of reaching an agreement - this process is subject to mediation and the choice is ultimately a political one. Verification itself, or "the certification of compliance, is very much of a subjective, ideological and political character" (p.102). Since perfect verification is unattainable, the requisite level will necessarily be arrived at arbitrarily. Some observations are made concerning the reluctance of states to accept verification measures. The political character of verification is apparent here, as states may seek unilateral political or military advantages through verification. The concept itself may also be used as a stumbling block to prevent agreement.

The requirement for verification itself is created by governments, and its central ideological purpose is its confidence-building function. As such, an adequate level of verification may be provided using national technical means, since the consequences of violations are minimal; that is, they would be political, rather than military in nature. With regard to more intrusive or cooperative means of verification, it is noted that such methods may complement national technical means insofar as they in themselves have a confidence-building potential. The difficulty of negotiating such measures might be circumvented by using a more incremental, step-by-step approach.

The optimal verification scheme will be modest in its scope to improve the prospects for acceptance. It will be specific so that its political acceptability might be enhanced, and it should be simple. This last requirement pertains more to the agreement itself, because, as a rule, more sophisticated agreements require more intrusive verification.

A19.1(I85)

A19.1(I85)

Proposal Abstract A19.1(I85)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

United Nations. General Assembly. "Compliance with arms limitation and disarmament agreements." Resolution 40/94(L), 12 December 1985.

See also: - "Compliance with arms limitation and disarmament agreements". Resolution 41/59(J), 3 December 1986. (Adopted without a vote). (Text essentially unchanged from 40/94(L)).

4. Summary:

This resolution was adopted with 131 votes in favour, none against and 16 abstentions. It is reproduced below in its entirety:

The General Assembly,
Conscious of the abiding concern of all Member States for preserving respect for rights and obligations arising from treaties and other sources of international law,

Convinced that observance of the Charter of the United Nations, relevant treaties and other sources of international law is essential for the strengthening of international security,

Mindful, in particular, of the fundamental importance of full implementation and strict observance of agreements on arms limitation and disarmament if individual nations and the international community are to derive enhanced security from them,

Stressing that any violation of such agreements not only adversely affects the security of States parties but can also create security risks for other States relying on the constraints and commitments stipulated in those agreements,

Stressing further that any weakening of confidence in such agreements diminishes their contribution to global or regional stability and to further disarmament and arms limitation efforts and undermines the credibility and effectiveness of the international legal system,

Believing that compliance with arms limitation and disarmament agreements by States parties is, therefore, a matter of interest and concern to the international community, and noting the role that the United Nations could play in that regard,

1. Urges all States parties to arms limitation and disarmament agreements to implement and comply with the entirety of the provisions subscribed to;

2. Calls upon all Member States to give serious consideration to the implications of non-compliance with those obligations for international security and stability, as well as for the prospects for further progress in the field of disarmament;

3. Appeals to all Member States to support efforts aimed at the resolution of non-compliance questions, with a view towards encouraging strict observance of the provisions subscribed to and maintaining or restoring the integrity of arms limitation or disarmament agreements;
4. Requests the Secretary-General to provide Member States with assistance that may be necessary in this regard.

A19.2(I85)

A19.2(I85)

Proposal Abstract A19.2(I85)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

United Nations. General Assembly. "Verification in all its aspects". Resolution 40/152(0), 16 December 1985.

See also: - Abstract A20.92(I86)

4. Summary:

This resolution was adopted without a vote. It is reproduced below in its entirety:

The General Assembly,

Conscious of the urgent need to reach agreements on arms limitation and disarmament measures capable of contributing to the maintenance of peace and security,

Convinced that, if such measures are to be effective, they must be fair and balanced, acceptable to all parties, their substance must be clear and compliance with them must be evident,

Reaffirming its conviction, as expressed in paragraph 91 of the Final Document of the Tenth Special Session of the General Assembly,¹ adopted by consensus at its first special session devoted to disarmament, that in order to facilitate the conclusion and effective implementation of disarmament agreements and to create confidence, States should accept appropriate provisions for verification in such agreements,

Reiterating its view that:

(a) Disarmament and arms limitation agreements should provide for adequate measures of verification satisfactory to all parties concerned in order to create the necessary confidence and to ensure that they are being observed by all parties,

(b) The form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement,

(c) Agreements should provide for the participation of parties directly or through the United Nations system in the verification process,

(d) Where appropriate, a combination of several methods of verification as well as other compliance procedures should be employed,

Recalling that:

(a) In the context of international disarmament negotiations, the problem of verification should be further examined and adequate methods and procedures in this field should be considered,

1. General Assembly resolution S-10/2.

(b) Every effort should be made to develop appropriate methods and procedures that are non-discriminatory and that do not unduly interfere with the internal affairs or other States or jeopardize their economic and social development,

Believing that verification techniques should be developed as an objective means of determining compliance with agreements and appropriately taken into account in the course of disarmament negotiations,

1. Calls upon Member States to increase their efforts towards achieving agreements on balanced, mutually acceptable, verifiable and effective arms limitation and disarmament measures;

2. Invites all Member States, bearing in mind the Final Document of the Tenth Special Session of the General Assembly,² the first special session devoted to disarmament, to communicate to the Secretary-General, not later than 15 April 1986, their views and suggestions on verification principles, procedures and techniques to promote the inclusion of adequate verification in arms limitation and disarmament agreements and on the role of the United Nations in the field of verification;

3. Requests the Secretary-General to prepare and submit to the General Assembly at its forty-first session a report containing the views and suggestions of Member States;

4. Decides to include in the provisional agenda of its forty-first session an item entitled "Verification in all its aspects" under the item entitled "Review of the implementation of the recommendations and decisions adopted by the General Assembly at its tenth special session: implementation of the recommendations and decisions of the tenth special session".

5. **Selected Comments by States:**

Several states submitted their views and suggestions to the Secretary General, pursuant to this resolution. Some of these are included in the Compendium as the following abstracts:

- (1) Argentina: A20.5(G86)
- (2) Austria: A20.51(G86)
- (3) Bulgaria: A20.52(G86)
- (4) Byelorussian Soviet Socialist Republic: A20.53(G86)
- (5) Canada: A20.54(G86)
- (6) China: A20.55(G86)
- (7) Czechoslovakia: A20.7(G86)
- (8) Finland: A20.71(G86)
- (9) German Democratic Republic: A20.56(G86)
- (10) Mexico: A20.57(G86)
- (11) Netherlands: A20.58(G86)
- (12) Norway: A20.59(G86)
- (13) Sweden: A20.591(G86)
- (14) Ukrainian Soviet Socialist Republic: A20.72(G86)
- (15) Union of Soviet Socialist Republics: A20.592(G86)
- (16) United States of America: A20.8(G86).

2. Ibid.

A20(G85)

A20(G85)

Proposal Abstract A20(G85)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors

3. **Source:**

United States. Arms Control and Disarmament Agency. Annual Report 1984. Washington: United States Government Printing Office, April 1985.

See also: United States. Arms Control and Disarmament Agency. Annual Report: 1982. Washington: US Government Printing Office, April 1983. (Abstract A10(G83)).

4. **Summary:**

Verification is denoted as a central concern in arms control negotiations, given the closed nature of Soviet society and the scope of their concealment and deception activities. The three central purposes of verification are outlined: it may provide timely warning of a threat to national security, it may help to deter violations of an agreement, and finally, it "is essential to ensure domestic and international confidence in the viability of a particular arms control agreement" (p. 68). Much of the text is devoted to an explanation of the effectiveness of verification and the political factors which dictate the acceptability of a given level of verification. Two phases in the verification process are distinguished; the first is simply a technical and analytic process which assesses the capabilities of cooperative and national technical means of verification to monitor the activities to be controlled. The second phase is somewhat more complicated, and incorporates other factors such as the costs, risks, and benefits of evasion and its ultimate impact on the whole arms control process. The quality of the evidence, however, remains as "the most significant aspect of the difficulty in verifying compliance" (p. 70).

Much attention is devoted to the risks posed by non-compliance, and it is stated that "violations of arms control agreements call into question the effectiveness of the arms control process itself" (p. 72). Non-compliance is thus accorded a high degree of significance, especially in view of the unreliability of the Soviets as negotiating partners. Consequently, verification and the enforcement of compliance are deemed to be an essential precondition for progress in arms control. The compliance record of the Soviets is then reviewed in detail and each agreement currently in existence is considered. Among these, some significant violations are discerned; for example, the Soviet Union has repeatedly violated both the 1925 Geneva Protocol and the 1972 Biological and Toxin Weapons Convention through its continued production and use of biological and chemical weapons.

A20.1(A86)

A20.1(A86)

Proposal Abstract A20.1(A86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - anti-ballistic missiles
 - ballistic missiles
 - cruise missiles
 - manned aircraft
 - missile tests
 - mobile ballistic missiles
 - reentry vehicles

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) Seismic sensors

3. Source:

Rowell, William F. Arms Control Verification: A Guide to Policy Issues for the 1980's. Cambridge, Mass.: Ballinger, 1986.

4. Summary:*

The book, which is intended for high-level US policy makers, has three purposes:

- (1) to provide a basic understanding of verification,
 - (2) to outline broad verification policy questions for the rest of the 1980's; and
 - (3) to outline major issues and viewpoints on these policy questions.
- The author lists three policy questions as the focus of the book:

- (1) "How do the ongoing developments in monitoring (transparency) and weapons (low observables) technology affect arms control verification policy choices?"
- (2) "What are the alternative standards and strategies involved in negotiating verification and their implications in this era of rapid technological change?"
- (3) "What can the president do throughout the arms control process to gain and maintain the confidence of Congress and the US public in his handling of critical verification issues?" (p. 8).

After a brief introduction (Chapter 1), the second chapter defines a broad conceptual framework for understanding the verification process. Chapter 3 examines the broad implications of technology for the verification process. Instead of a detailed description and assessment of monitoring technology, the focus is on delineating technological trends. Chapter 4 examines the role of verification in the negotiation process. Again the focus is on broad

* This book was received too late to provide a detailed summary.

policy alternatives rather than specific negotiations. The fifth and sixth chapters deal with the public aspects of verification: Chapter 5 with negotiations and treaty ratification and Chapter 6 with compliance and response.

Chapter 7 summarizes the major verification points and key policy issues that face the US President in the next few years, including critical factors that must be considered. Among these issues and factors are the following:

- (1) "Fundamental to understanding arms control verification is an appreciation of the contrast between the public perception of its simplicity and the reality of its complexity.... Much of this complexity arises from verification's multidimensionality; verification issues involve a variety of perspectives -- technical, legal, strategic/military, and political. Appreciating verification's dual nature and developing policies that properly take into account these conflicting perspectives are major challenges to national policymakers" (pp. 147-148).
- (2) "The reason for verification is simply to provide assurances that all parties to an arms control agreement are complying with its terms" (p. 148). The contribution of specific verification measures to this broad goal must be evaluated in terms of the three major purposes of verification:
 - (a) Detection and warning of potential violations;
 - (b) Deterrence of violations;
 - (c) Building public confidence in the viability of an arms control agreement.
- (3) "To provide the necessary assurances, verification considerations must be an integral part of the entire arms control process from negotiations through implementation of the agreement.... The handling of compliance questions will depend on the way verification provisions were negotiated." (pp. 148-149).
- (4) "The complex, intimate relationship that arises from the sharing of the monitoring task by the verification and intelligence processes has significant implications for verification policy. On the simplest level there is the competition for scarce monitoring resources. Concerns over compromise of sensitive sources and methods of intelligence permeate the verification process. The potential use of verification collection assets for espionage such as through phoney on-site inspections, and the conflicting use of intelligence information for both verification and targeting of weapons systems further complicate the relationship. On the other hand, these overlaps have created important synergies arising from the more precise tasking required for verification, the high level of interest in arms control, the extensive personal relationship developed over the years by the arms control and intelligence community, and the sharpening effect of critical congressional oversight" (p. 149).

- (5) There are two common misperceptions on the nature of verification. "First, because of their heavy dependence on technology, verification issues have been traditionally regarded purely as technical issues with their political dimension mistakenly ignored. Second, the widespread misconception that an arms control agreement is an enforceable legal contract has created many unrealistic expectations over US options for handling compliance questions. Adopting a combined strategic/military and political perspective provides a much more realistic, useful way of addressing complex compliance questions" (p. 150).
- (6) Since the development of low-observables technologies "an increasingly larger percentage of capable weapon systems can no longer be confidently monitored by unaided national technical means (NTMS) of verification" (p. 150).
- (7) Cooperative measures of verification (ie. non-intrusive measures to facilitate NTMs and intrusive measures to independently generate data difficult to obtain through NTMs) have been incorporated into several bilateral treaties." However because these treaties have yet to be fully implemented, the costs, benefits, and implications of such measures remain unclear. Given the problems of monitoring smaller, mobile weapon systems and the desire to more directly limit Soviet systems, there has been wide support for a variety of cooperative measures. Notwithstanding the specific benefits for each measure, cooperative measures will be more difficult to negotiate...". (pp. 150-151).
- (8) "On-site inspection (OSI) has been a continuing issue not only between the United States and the Soviet Union but also within the United States itself. With few exceptions the Soviets have consistently opposed OSI proposals, calling them an excuse for Western espionage.... OSI supporters have emphasized its detection and deterrence value and minimized its costs -- financial, political (false alarms, allied cooperation, Soviet domestic intrusion), national security (intelligence compromise, Soviet espionage), and required US negotiating concessions. On the other hand, skeptics of OSI argue that the marginal contributions of OSI, which are thought to be principally confidence-building, generally do not justify the costs. Further, these skeptics often charge that unwarranted demands for OSI masquerade as excuses to block arms control agreements" (p. 151).
- (9) "Standards of verification whether labeled "absolute", "adequate," or "effective" are not pure, well-defined concepts but represent a range of conflicting assessments of how much uncertainty is acceptable....
Three perspectives on verifiability are especially worth keeping in mind. First, it makes sense to evaluate the verifiability of an agreement, not simply in terms of the verifiability of each provision but rather in the context of the whole agreement.... Second, in a larger sense, verification is only one aspect that

must be considered in evaluating an arms control agreement.... Third, verifiability of an agreement should be comprehensively assessed with regard to the three purposes of verification -- detection and warning, deterrence, and confidence-building -- rather than with the traditional, narrow focus on detection and warning" (p. 152).

- (10) "In verification negotiations, the informational asymmetry created by the open US society versus the closed Soviet society is the predominant fact of life.... The Soviet Union's principal interest in verification is its potential as a bargaining chip and the Soviets' principal concern is to prevent Western espionage and intrusion into Soviet society. US experience in negotiating verification with the Soviets has shown the need for justifying US verification requirements not only with a solid technical rationale but often with an overtly political one -- congressional approval" (p. 154).
- (11) Public and congressional pressure to sign an agreement raise three risks: (1) "failing to reach the internal government consensus required to defend the agreement's verifiability before Congress"; (2) "glossing over important verification issues"; and (3) "deferring substantive verification issues to postnegotiation forums where the United States will have considerably reduced leverage" (p. 154).
- (12) "The significance of suspected arms control violations only depends on their strategic/military and political value, not on their narrow legal or technical value. For an agreement between sovereign states on matters vital to their national security, there are no legal bodies with enforcement powers. Thus, unless a decision has been made to abrogate the agreement, the handling of compliance questions must be a consensual process. Equally important, the problem of handling compliance questions is inseparable from the problems of responding to violations. Considerations of response mean that not all compliance questions are necessarily handled in the same manner" (p. 156).
- (13) "Recent events have raised the distinct possibility that future arms control agreements may be increasingly informal, ad hoc agreements (perhaps in some cases imposed by Congress) rather than the broad, detailed comprehensive agreements of the past. In such an environment compliance and response policies and their attendant strategic/military considerations are likely to assume commanding importance while some of the more complex aspects of verification -- negotiations, cooperative measures, and legal considerations -- will diminish in importance. The need to enhance the deterrent value of such arrangements in the eyes of the Soviet Union demands that Soviet compliance be closely connected with credible US sanctions. Nevertheless, the premium for rapid assessments of verifiability resulting from such a fundamental change in the direction of arms control makes all the more critical the need for high-level policymakers to grasp readily the multidimensional complexity of verification issues" (pp. 157-158).

A20.2(G86)

A20.2(G86)

Proposal Abstract A20.2(G86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - ballistic missiles
 - comprehensive test ban
- (c) Chemical weapons - destruction of stocks
 - destruction of facilities
 - production
- (d) Conventional weapons - ground forces

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
 - control posts

3. Source:

Union of Soviet Socialist Republics. "Letter dated 20 January 1986 addressed to the President of the Conference on Disarmament by the Representative of the Union of Soviet Socialist Republics transmitting the statement of the General Secretary of the CPSU Central Committee, Mikhail Gorbachev, Made on 15 January 1986". CD/649, 20 January 1986.

4. Summary:

The Politburo of the CPSU Central Committee and the Soviet Government have decided on a programme aimed at the complete elimination of nuclear weapons throughout the world within the next 15 years. Verification of the destruction or limitation of arms would be carried out both by national technical means and through on-site inspections. The USSR is ready to reach agreement on any other additional verification measures.(p. 4)

Any reference to verification as an obstacle to the establishment of a moratorium on nuclear explosions is totally groundless. Verification is no problem so far as the USSR is concerned. Should the United States agree to stop all nuclear explosions on a reciprocal basis, appropriate verification of compliance with the moratorium would be fully ensured by national technical means as well as through international procedures, including on-site inspections whenever necessary.(p. 5)

The Soviet Union is in favour of the early and complete elimination of chemical weapons and of the industrial base for their production. It is prepared for timely declaration of the location of enterprises producing chemical weapons and for the cessation of their relevant production and is ready to start developing procedures for destroying the relevant production base and to proceed to the destruction of stockpiles of chemical weapons. All these measures would be carried out under strict international control including international on-site inspections.(p. 8)

A possible agreement on European troop reductions would naturally require reasonable verification. As for compliance with the commitment to freeze the number of troops, in addition to national technical means permanent verification posts could be established to monitor any contingents entering the reduction zone.(p. 8)

A20.3(A86)

A20.3(A86)

Proposal Abstract A20.3(A86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
- (d) Complaints procedure - consultative commission

3. Source:

Abarenkov, V.P., Kalamanov, V.A. and Kokoshin, A.A. "Questions of Verification and Arms Limitation in Soviet-American Agreements". Ekonomika, Politika, Ideologiya, No. 2. (February 1986).

4. Summary:

This article discusses Soviet views on the verification of arms control agreements and reviews the provisions for verification in past agreements. The authors state that questions of verification of the implementation of arms limitation and disarmament agreements concern the vital interests of states' security, and for this reason ensuring the confidence that all participants will strictly observe the provisions of such agreements is of exceptional importance. Questions of verification are not simple, and their technical complexities are obvious, particularly if one takes into account that new types of weapons, which make verification increasingly difficult, are constantly being created. However, historical experience attests to the fact that, when there was political will to reach agreement, the technical aspects of verification measures never seemed insoluble.

The greater the confidence in and understanding of the common interest in curbing the arms race, the easier it is to agree on concrete measures of verification. The development of concrete measures of verification must be based on scientifically substantiated principles which have been prompted and confirmed by practice. These principles should be based on such paramount tenets of international law, primarily laid down in the United Nations Charter, as sovereign equality and non-interference in states' domestic affairs.

The success of the entire movement toward disarmament depends on the theoretical postulation of the question of verification with application to the practical development of a particular arms limitation measure. International practice provides a considerable number of examples of directly opposite approaches to aims and tasks of verification on a theoretical level, which have arisen from directly opposing world policy lines of the USSR and the United States. The Soviet Union considers that it is necessary for there to be cooperation between signatories to agreements in removing possible

vagueness or doubt in the observance of agreements in an atmosphere of good will, so that matters do not come to unnecessary or unjustified arguments, claims, and counterclaims. The United States proceeds from the necessity of interference in the internal affairs of states through obligatory on-site inspection, regardless of whether there is a need for such on-site inspection or not.

The Soviet Union has never separated verification from disarmament or, equally, disarmament from verification, considering them both to form a unified whole. The United States attempts to substitute verification of arms without disarmament for disarmament itself. The USSR defends the principle that verification must ensure the observance of agreements. M.S. Gorbachev stated in an interview in TIME magazine, "we do not trust the Americans any more than they trust us, and for this reason we are as interested as they are in making every agreement subject to reliable inspection." Speaking at a news conference at the end of the Geneva summit meeting, Gorbachev stated that, "if an accord banning the transfer of weapons to outer space is reached, we are ready to open our laboratories for verification of such an accord." Speaking on possible verification of a moratorium on nuclear testing, Gorbachev said, "if the American side also halts any testing of nuclear weapons, and we conclude an agreement on this, then again there will be no problems with verification, including international verification on our side."

Verification must be correlated with a concrete disarmament measure; there must be proportionality between verification and disarmament measures. There must be complete coincidence between a particular disarmament measure and a concrete measure to verify its observance. Otherwise an excessive verification measure would lead to a virtual evasion of the agreement with the aim of gathering information not envisaged by the agreement. At the same time, inadequacy of the verification measures could entail the risk of willful violation of the agreement.

The authors deny that the verification issue poses true obstacles to arms control agreements, contending that national technical means of verification are sufficiently effective. However, the Soviet Union has repeatedly stated the expediency of developing additional means and methods of verification, including certain forms of international verification, taking into account the actual development of events in weaponry. The more complex weapon systems become, the more difficult it is to develop agreements and measures to verify their implementation. When it is a question of what kind of warhead, conventional or nuclear, a cruise missile is carrying, or of how many warheads an ICBM is carrying, no inspection, even on-site, is capable of providing an adequate answer.

Of great importance when verification is carried out is the principle of non-interference in the internal affairs of states, proceeding from generally accepted tenets of international law and taking into account the realities of the political world as well as the possibility of using verification for purposes incompatible with its function. Also of great importance is the specific nature of

verification. The specific nature of the weapons dealt with in a particular agreement gives rise to the necessity of a individual approach in each case to the development of forms and methods of verification.

The Soviet Union believes that questions of the verification of the fulfillment of agreements to limit strategic weapons must be resolved primarily on the basis of national technical means of verification. Another important verification mechanism is the permanent consultative committee. This recognizes the necessity and importance of cooperation in the calm atmosphere of diplomatic contacts to resolve delicate questions concerning the sides' national security.

A20.4(G86)

A20.4(G86)

Proposal Abstract A20.4(G86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - ballistic missiles
 - comprehensive test ban
- (c) Regional arms control - outer space
- (d) Chemical weapons - distruction of stocks
 - production
- (e) Conventional weapons - ground

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) International exchange of information
- (d) Short-range sensors - monitoring devices
- (e) On-site inspection - selective
 - control posts

3. Source:

Shabanov, V. (USSR Deputy Defence Minister). "A Most Important Element in the Disarmament Process". Izvestiya, (24 March 1986): 5.

4. Summary:

The author argues that the solution of the problem of verification is of fundamental importance in the program for the elimination of nuclear and other types of weapons of mass destruction as put forward by M.S. Gorbachev on 15 January 1986. He charges that the United States has hidden behind the "problem of verification" that they themselves have invented. The Soviet Union has clearly stated that it is prepared to accept any sensible verification measures if they really promote the limitation of the arms race. However, there is a need for the amount and methods of verification to accord with the nature and scope of specific accords.

The experience of monitoring the execution of existing bilateral and multilateral treaties and agreements confirms the indisputable priority of national technical means of verification. If necessary, the Soviet Union is prepared to draw up and adopt additional measures to promote the effectiveness of verification using national technical means. These may include various types of notifications and exchanges of quantitative information on arms. Other additional verification measures may be adopted up to and including on-site inspection. However, these measures should not serve as a tool for interfering in states' internal affairs and should not damage either side. The USSR's position on verification is an embodiment of the Soviet concept of creating a comprehensive international security system envisaging a strictly verifiable reduction in the level of states' military potentials to limits of sensible sufficiency.

In implementing the program for the elimination of nuclear weapons, verification of the arms being destroyed and restricted would be carried out by national technical means and through on-site inspections. Any other additional methods of verification are possible. The Soviet Union sees no insuperable obstacle in the way of solving the problem of verification of the destruction of nuclear weapons and is prepared to agree to the most radical solutions of this problem on a mutual and equal basis.

For verification of the cessation of nuclear testing existing national technical means make it possible to verify nuclear explosions with high accuracy and reliability. If the United States ends all nuclear explosions on a reciprocal basis, the proper verification will be entirely ensured by national technical means, with the help of international procedures and, if necessary, with on-site inspection.

In the sphere of banning space strike arms the Soviet Union favours the strictest verification, including opening up the relevant laboratories to inspection on a reciprocal basis.

The Soviet Union is prepared in practice for any verification measures that guarantee the security of states participating in the destruction of chemical arsenals. The USSR advocates the strictest and most reliable verification both of the elimination of chemical weapons and of the industrial base for their manufacture. At sites where the destruction of chemical weapons stockpiles is to take place stringent verification will be ensured by having international inspectors constantly in attendance or by combining systematic international inspections with the use of measuring devices at the sites. Similar verification may be used at the sites where permitted quantities of the banned chemicals will be produced for scientific, agricultural, medicinal or other non-military purposes.

The Socialist countries are proposing effective verification measures for the reduction and freezing of troops and arms in Central Europe including exchange of lists of units subject to withdrawal and freezing, reciprocal notification of maneuvers, on-site inspections following a justifiable request, creation of an advisory committee, multilateral or bilateral consultations between interested parties and the establishment of permanent centres for monitoring entry and exit to and from the reduction area.

The initiatives put forward by the Soviet Union on verification measures are aimed at promoting the intensification of the talks in progress and the removal of the artificial obstacles put in the way of the talks by the United States.

A20.5(G86)

A20.5(G86)

Proposal Abstract A20.5(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

Argentina. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: Abstract A19.2(I85)

4. Summary:

Any instrument in the field of disarmament must include adequate machinery for verification satisfactory to all states concerned. Procedures and techniques to be used must be determined in each case taking into account the objective, scope and nature of the instrument under negotiation. Verification clauses should be agreed on at the same time that the instrument in question is being negotiated so that the demand for prior settlement of this question does not constitute a pretext that might condition the beginning of the negotiations. The structure of any verification system must be absolutely free from any feature that might have a discriminatory effect and must be based on equality of the parties' rights and obligations. It must provide for access by all parties to the verification machinery. Verification provisions must be sufficient to guarantee the effectiveness of the treaty and should be aimed at establishing confidence in the application of its criteria.

A20.51(G86)

A20.51(G86)

Proposal Abstract A20.51(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

Austria. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.
See also: Abstract A19.2(I85)

4. Summary:

Even the most elaborate verification system will be unable to replace trust in the other party as the essential pre-condition for the conclusion of any arms control and disarmament treaty. Verification, as a process of determining that a party is complying with its treaty obligations, has valuable functions in that it deters noncompliance, promotes confidence-building and facilitates assessing the value of a treaty.

It is easier to verify a complete ban on a weapons system than numerical limitations. Lack of precision in the wording of obligations in arms limitation treaties and of verification provisions can result in serious problems due to differing interpretations. No procedures have been developed on what steps should be taken when a violation is detected.

Multilateral arms control and disarmament agreements usually contain weak provisions concerning verification. Austria believes that verification should be adequate, acceptable, universal and non-discriminatory. Adequate verification should be able to detect beyond any reasonable doubt a violation of an agreement. As not all states have resources to participate directly in the verification process, international organizations such as the IAEA have been assigned an important role. Thought should be given as to whether an enhanced role should be assigned to the UN.

Before negotiating verification procedures there should be a critical examination of the factors and principles in the verification process, including research into improved capabilities more amenable to acceptance. Only after gathering in-depth information can verification measures be best adapted to the obligations agreed upon.

The role of the UN in verification should be enhanced by strengthening its capacity to investigate allegations of non-compliance. The UN could also offer assistance and technical expertise to negotiators in any regional arms control and disarmament process.

A20.52(G86)

A20.52(G86)

Proposal Abstract A20.52(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - IAEA safeguards

3. Source:

Bulgaria. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.
See also: Abstract A19.2(I85)

4. Summary:

A political decision of states to enter into negotiations voluntarily and to undertake specific treaty commitments is the most solid guarantee that these commitments will be honoured. Since arms control and disarmament agreements affect the most vital security interests of states, they require additional guarantees that all participants will honour their commitments. These guarantees are provided by effective verification.

The establishment of a system of the strictest possible verification is an extremely important factor in the disarmament process. The whole point of verification is that it should apply to the implementation of real disarmament measures and to the observance of specific agreements in this area. Negotiations on verification must not precede the achievement of specific disarmament agreements and must not be made the pre-condition for the achievement of such agreements.

Verification activity must be organized so as to help create a favourable political climate, avoid unnecessary confrontation and protect and stimulate the lawful activities of states. The basic purpose of verification is to provide a mechanism for strengthening mutual confidence and understanding and removing suspicion and fostering relations between countries. Verification provides essential channels for clarifying uncertainties in the conduct of parties and for solving a number of these problems before they become too serious. Verification strengthens the confidence of states in long-term security policy and in the sincerity of other parties, and expands international co-operation on disarmament issues.

Respect for equality and equal security and noninfringement of the security of any party is an essential condition of verification and of the operation of verification bodies. Verification procedures

must be nondiscriminatory and not unduly interfere with the internal affairs of other states or jeopardize their economic and social development.

The only proper verification is (a) conceived within the framework of a specific arms limitation and disarmament agreement, (b) is strictly consistent with the subject of the agreement, and (c) does not go beyond its functions and competence as defined in the agreement. It should not precede the establishment of specific legal norms containing obligations which are to be verified. The subject, scope, form and means of verification must be defined in the agreement itself. Verification activity, including the operation of verification bodies, may begin only when an agreement enters into force and the parties have begun to fulfil their obligations. The combination of specific national technical means of verification and international forms of verification must be appropriate to the nature and scope of the practical disarmament measures undertaken. Verification that is not linked to its natural objective is legally meaningless and politically untenable.

The positive experience of the International Atomic Energy Agency in applying a safeguards system shows that such verification machinery could be used in one way or another for verification of compliance with future agreements.

The achievements of modern science and technology are turning verification problems into political ones and making their successful solution dependent solely on the political will of the parties.

A20.53(G86)

A20.53(G86)

Proposal Abstract A20.53(G86)

1. **Arms Control Problem:**

- (a) Any arms control agreement
- (b) Nuclear weapons - ballistic missiles
 - comprehensive test ban
- (c) Regional arms control - outer space
- (d) Chemical weapons - destruction of stocks
 - production

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective

3. **Source:**

Byelorussian Soviet Socialist Republic. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: Abstract A19.2(I85)

4. **Summary:**

Verification measures must facilitate the practical implementation of arrangements for limiting the arms race and bringing about disarmament. There is a need for the speediest possible elaboration and application of such measures because the development of military technology has already made the problem of monitoring armaments extremely difficult.

Verification measures must be appropriate to the scope and nature of the obligations assumed by the parties. Use should be made of the best combination of various verification methods, both national technical means and international procedures, including on-site inspection when necessary. Experience has confirmed the indisputable effectiveness of national technical means. Supplementary arrangements to enhance the effectiveness of verification by national technical means can be elaborated and adopted if necessary. These would consist primarily of various notification procedures and the exchange of quantitative data about arms. Other verification measures, up to and including on-site inspection, may also be adopted. Demands for verification in isolation from real arms limitation and disarmament are designed to impede efforts to move forward along the road to disarmament.

For the elimination of nuclear weapons, verification of weapons to be destroyed and subjected to limitation may be carried out both by the use of national technical means and through on-site inspection. Any other control measures are also possible. In the event of the complete and comprehensive elimination of nuclear arms in accordance

with the program proposed by the USSR, it will also be possible to establish universal international verification.

The possibilities offered by national technical means of verification have long since rendered baseless any references to difficulties in verification of the cessation of nuclear weapon tests. Effective verification of compliance of a moratorium on nuclear testing may be fully achieved by the combined use of national technical means and international procedures, including on-site inspection if necessary. Agreement should be reached on arrangements for observers of the United States and the USSR to visit the locations of unexplained phenomena, on a reciprocal basis and upon request, in order to remove any possible doubts as to whether they might be connected with nuclear explosions.

With regard to space strike weapons, a ban on their production, testing and development should be subject to strict verification, including the opening of relevant laboratories for inspection.

With regard to the production and elimination of chemical weapons and of the industrial base for their production, all measures should be carried out under strict international controls, including international on-site inspection.

In the talks on the mutual reduction of Forces and Armaments in Central Europe, the USSR's initiative of April 1986 concerning a significant reduction of all components of the land forces and tactical air forces of the European States, as well as those of the United States and Canada stationed in Europe, was accompanied by a proposal for the establishment of reliable verification at all stages of this process, both through the use of national technical means and with the help of international verification, including on-site inspection if necessary.

The main guarantee that the provisions of agreements will be fulfilled is the legal obligation upon the states that have concluded them. Verification is not an end in itself. Its principle function is to ensure an effective solution of the problem of preventing nuclear war, averting an arms race in outer space, limiting weapons and bringing about disarmament in all areas. Disarmament without verification is impossible, but verification without disarmament is meaningless.

A20.54(G86)

A20.54(G86)

Proposal Abstract A20.54(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) International control organization
- (c) On-site inspection - IAEA safeguards

3. Source:

Canada. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: - Abstract A19.2(I85)

- Verification In All Its Aspects: A Comprehensive Study on Arms Control and Disarmament Verification Pursuant to UNGA Resolution 40/152(0). Ottawa: Department of External Affairs, April 1986.

4. Summary:

Arms control agreements touch upon the most sensitive aspects of national security. Consequently, reciprocal confidence that all parties will adhere to their obligations is essential. Verification is the means by which such confidence is assured. Verification serves functions that are essential to the long-term success of the entire arms control and disarmament process. These functions are deterrence of non-compliance, confidence-building and treaty assessment. The verification process does not in itself address the issue of what can or should be done in the event of misconduct. No judicial function is involved.

It has been contended that the emphasis on verification has been used as a pretext for impeding progress in the negotiation of agreements and that verification means are also used for the gathering of intelligence unrelated to the verification task. These criticisms reflect valid concerns about the utility of verification research not linked to specific agreements, about the political motivation that may underlie varying approaches to verification issues, and about the implications for the arms control and disarmament process of excessive concern with the perfectability of verification measures. Intensive study of the verification issue can allay many of these concerns and facilitate the arms control and disarmament process. There are many initiatives that can be undertaken to develop a range of instruments -- legal, institutional and technological -- that could contribute to the potential for the verification of specific agreements. General research into verification techniques also promises that effective verification systems can be made less intrusive and more acceptable to parties concerned about the potential intelligence-gathering capabilities of verification systems.

The view that generic research into and discussion of verification is not productive ignores the fact that the general principles of verification developed at UNSSOD I have applicability to all specific arms limitation issues. It also ignores the possibilities for developing general procedures and techniques that could be applied in specific arms limitation contexts.

Governments should formulate verification provisions in conformity with the principles developed at UNSSOD I which include: (a) adequacy; (b) acceptability; (c) appropriateness; (d) universality; (e) verification methods and procedures in combination; (f) nondiscrimination; (g) minimum interference; and (h) nonjeopardizing of economic and social development.

It is likely that the multilateral dimension of arms control will become increasingly significant due to the need to deal with existing or potential weapon systems for which a large number of countries have a capability, the increasingly recognized interest in precluding or controlling weapons deployment in certain specific environments and the growing recognition of the desirability in principle of universal commitments to agreed arms control measures. In addition to the technologies that have been developed, the consultative procedures and collateral measures that the US and USSR have elaborated in a bilateral context could be of considerable instructive value in the multilateral context.

For resolution of some of the more difficult problems in the verification of multilateral agreements the experience with bilateral agreements offers only partial guidance. These problems include: equitable sharing of rights, responsibilities and costs; the delegation of executive and operational responsibilities in ways that make the principles of acceptability, universality and nondiscrimination operationally meaningful; and the effective coordination of procedures and techniques in order to ensure that the entire verification process is adequate, appropriate and minimally intrusive.

To meet these requirements parties to an agreement might delegate responsibility for data collection and interpretation to a selected group of countries possessing the relevant technological and other resources. Such an approach would need to involve a careful elaboration of agreed terms of access to information and agreed decision-making procedures for the purpose of taking action in light of the interpreted data. Another approach might be the creation of an international verification organization (IVO) specifically for the purpose of monitoring the implementation of arms control and disarmament agreements. An IVO could be responsible for conducting verification activities in relation to several different agreements or in relation to only one specific agreement. Of greatest interest as a model of agreement-specific IVO is the International Atomic Energy Agency. Agreement specific IVOs could serve as stepping stones toward the creation of a general IVO with broader responsibilities. All aspects of the verification process must be expressly accepted by all parties to an agreement.

There are a number of ways in which the UN might acquire an enhanced role in the verification process:

- (1) It could give further consideration in the General Assembly or the Disarmament Commission to the essential role verification plays in the arms limitation process.
- (2) It could examine the possibility that individual nations or groups of nations possessing verification expertise could offer such capabilities to the international community for use in the verification of multilateral agreements.
- (3) It could undertake research and examination of the organizational structures, procedures and techniques that might be developed for use by IVO-type organizations.
- (4) It could provide greater assistance and technical expertise to negotiators in the regional arms control process with a view to combining international mechanisms with regional measures for verification.
- (5) It could involve itself in the formulation and execution of verification provisions within agreements and should be prepared to help bring together verification expertise and encourage states to develop procedures through which this expertise could be applied in specific agreements.
- (6) It could secure a stronger role in future regional arms limitation agreements. For example, should a space-based remote sensing system be an appropriate verification technology for a regional arms limitation agreement, it would be both reasonable and cost-effective for this verification capability to be generated by a group of capable nations and provided for use under the auspices of the UN or a regionally-based IVO in the context of the agreement.

Adequately verified arms control and disarmament agreements could provide the means whereby certain basic information needs could be met under conditions where interference is minimized, sovereignty is respected and distrust is largely dispelled. While the negotiation and implementation of agreed verification measures will always be agreement specific, there is a vast scope for constructive activities by governments and international bodies in refining and expanding the technological, organizational and institutional options available for verification purposes.

A20.55(G86)

A20.55(G86)

Proposal Abstract A20.55(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

China. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.
See also: Abstract A19.2(I85)

4. Summary:

The following principles should be taken into account in international disarmament negotiations on the question of verification:

- (1) The provisions concerned should be determined by the purposes, scope and nature of the relevant disarmament agreements.
- (2) The role of necessary international verification means should be affirmed. International and national verification means can be employed in combination. All the countries concerned should make available the necessary material and data obtained by them through national verification means.
- (3) Verification should be both effective and appropriate. It should not be discriminatory in form and method, should not cause interference in the internal affairs of the relevant countries or hindrance to their economic and social development.
- (4) The UN and its related international organs have made important contributions in the field of setting up an international verification system and they should play an even more active role in the future.

A20.56(G86)

A20.56(G86)

Proposal Abstract A20.56(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) Complaint procedure - consultation and cooperation
- (c) On-site inspection - selective

3. Source:

German Democratic Republic. [Response to UNGA Resolution 40/152(0)].

In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: - Abstract A19.2(I85)

4. Summary:

Verification is an extremely important element of disarmament agreements. Agreements on arms limitation and disarmament should be subjected to genuine and effective verification commensurate with the scope and nature of the obligations entered into. Reliable verification measures include, if need be, on-site inspections.

The issue of verification is inseparately connected with concrete measures toward arms limitation and disarmament and can only be addressed in connection with clear-cut agreements on such measures. The GDR holds that:

- (1) The forms and modalities of verification in any specific agreement should depend on the purposes, scope and nature of the respective agreement.
- (2) Verification should be based on equality and equal security, should be non-discriminatory, and should not interfere in internal affairs or jeopardize economic and social development.
- (3) If necessary, a combination of several means of verification should be employed.

Verification measures are intended to enhance confidence that agreements on arms limitation and disarmament will be honoured. The principles of peaceful coexistence and respect for the legitimate interests of all sides are conducive to the development of reliable verification procedures.

The history of disarmament negotiations proves that whenever all sides were willing to reach an agreement then workable arrangements have also been found as regards verification. Scientific-technological innovation in fields such as remote sensing by satellites and seismology has led to a rapid refinement of technical means of verification.

Verification issues should be considered and settled in the context of negotiations on concrete measures of disarmament, making it possible to select the best combination of verification means, procedures of consultation and co-operation, as well as international on-site inspections.

A20.57(G86)

A20.57(G86)

Proposal Abstract A20.57(G86)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

Verification - general

3. **Source:**

Mexico. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: - Abstract A19.2(I85)

4. **Summary:**

A disarmament agreement that does not have an adequate verification system will be totally ineffective. The verification system must be determined in conformity with the modality of each agreement. There will be cases in which it may be necessary to use a combination of various verification methods, as well as other procedures, to verify compliance.

While it is hardly advisable to attempt to develop a general verification system, the general verification principles developed during the first special session of the General Assembly devoted to disarmament can be applicable to various agreements on disarmament. Similarly, it is possible to develop general verification techniques and procedures that can be applied to specific disarmament agreements.

The question of verification must not be used as a pretext for impeding the conclusion of disarmament agreements.

A20.58(G86)

A20.58(G86)

Proposal Abstract A20.58(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

Netherlands. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.

See also: - Abstract A19.2(I85)

4. Summary:

The submission by Netherlands was made on behalf of the twelve member states of the European Community.

Verification should fulfil two functions: it should monitor the implementation of the disarmament measures agreed upon, in conformity with the provisions of the agreement in question, and it should also monitor long-term compliance with the provisions of the agreement in question. Adequate and effective methods must be agreed upon specifically for each topic of negotiation. Necessary measures range from non-interference with national technical capability to on-site inspection. The pace of technological development in all military fields means that advanced technology must also be applied to verification. Concrete elaboration of possible verification methods and procedures, determined by the purposes, scope and nature of the agreements cannot disregard the technical aspects and should be based on the decisive input of experts.

The scope of verification measures must guarantee that every state which has signed a disarmament agreement can detect any violation of that agreement. Verification measures should be "satisfactory" to all parties, in order to create the necessary confidence. Every state has the right to press for verification requirements it deems appropriate.

The modalities of verification can contribute to a progressive strengthening of mutual confidence. There must be efforts to reach a consensus that is much broader than a mere definition of the lowest common denominator. Concern over the cost of verification measures, or their intrusive nature, is no justification for a narrow interpretation of their scope.

A20.59(G86)

A20.59(G86)

Proposal Abstract A20.59(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) On-site inspection - selective
 - challenge
- (c) Remote sensors

3. Source:

Norway. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.
See also: - Abstract A19.2(I85)

4. Summary:

All disarmament and arms control agreements must contain effective verification measures that enhance adequate monitoring of compliance with the agreements. Verification measures should be adapted to the purposes, scope and nature of the agreement. A combination of several methods of verification could be employed including, inter alia, on-site inspection on a routine or a challenge basis, international data exchange, and national technical means.

In order to ensure full compliance with a disarmament agreement, a request for an on-site inspection should be dealt with without delay. A legitimate request for such an inspection should not be refused.

A20.591(G86)

A20.591(G86)

Proposal Abstract A20.591(G86)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) Verification - general
- (b) Remote sensors - satellite

3. **Source:**

Sweden. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422, 11 July 1986.
See also: - Abstract A19.2(I85)

4. **Summary:**

Adequate verification can serve several purposes: (a) ensure that undertakings entered into are fully complied with by all parties; (b) safeguard against unfounded suspicions and accusations; (c) deter violations by posing a credible threat of disclosure; and (d) serve to enhance the confidence of the international community in disarmament agreements.

There is a close interrelationship between the elaboration of an agreement and the elaboration of verification provisions to assure compliance with that agreement. It is important to choose parameters in such a way that they can be verified without excessive intrusiveness. The form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement.

There is a relationship between the military significance of an agreement and the need for verification. The greater the significance, the greater are the demands on the provisions for verification. The shorter the time span between a hypothetical breach of an agreement and the security-related effects of that breach, the greater is the need for effective verification.

It should not be left to the nations most advanced in military technology to determine what constitutes adequate verification of agreements that are also of vital importance for the security of other states. Sweden has invested considerable resources in order to form an independent opinion on the verification of a comprehensive test-ban treaty and a chemical-weapons convention. Verification methods must be found which take into account the needs of all states. Verification arrangements set up within the framework of the UN can in some cases be of great importance.

The present state of the art of seismic detection and identification, particularly when supplemented by other available methods, makes adequate verification of a treaty prohibiting

underground nuclear testing possible. To prepare for the establishment of such a verification system there is a need to embark on further substantial work, both in terms of drafting provisions and in the technical field.

In the negotiations on a chemical-weapons convention, if a useful balance between routine and challenge verification is found, the beneficial implications for disarmament agreements in other fields are obvious.

Sweden has always considered the provisions for verification and complaints regarding the Biological Weapons Convention to be inadequate. There is a strong need for better procedures, including a more effective consultation machinery.

The solution of many practical problems relating to verification of existing and future multilateral disarmament agreements could be facilitated by international satellite verification.

Of the wide variety of verification measures that may be used, national technical means have undisputable priority. The Soviet Union is prepared to co-operate in the elaboration, where needed, of additional measures, up to and including on-site inspections, which would help make national technical means of verification more effective; but such measures must not serve as an instrument of interference in internal affairs, be detrimental to the interests of any of the parties, or be used for purposes wholly unrelated to those of verification. Verification must be of a kind that would give the parties the appropriate confidence that the commitments they have entered into will be implemented consistently and that no activities will be undertaken that would in any way circumvent the limitations established.

The Soviet programme for the complete and general elimination of nuclear weapons provides for verification of the weapons to be destroyed and limited to take place primarily through national technical means. The USSR is ready to agree to any other additional measures, including, if necessary, on-site inspections. There must be reliable verification, including international verification, of the destruction or conversion of weapons.

If an agreement is reached to prohibit the introduction of weapons into outer space, the Soviet Union is prepared to open up its laboratories, on a reciprocal basis, for verification of such an agreement. If the United States agrees to the discontinuance on a reciprocal basis of all nuclear explosions, proper verification of the observance of the moratorium will be fully ensured by national technical means as well as with the help of international procedures, including, where necessary, on-site inspection. The Soviet Union has expressed its readiness to accept the offer of the six signatories to the Delhi Declaration to assist in verification of the discontinuance of nuclear tests.

The complete elimination of chemical weapons and of the industrial base for their manufacture should be implemented under strict verification, including international on-site verification. The USSR favours the systematic international verification of the destruction of chemical-weapon stockpiles and of the production of highly toxic lethal chemicals for permitted purposes. Systematic international on-site inspection should become the basic form of international verification of the fulfilment of the key provisions of a future convention on the prohibition of chemical weapons.

In its initiative of April 1986 entailing a significant reduction of the land and tactical forces in Europe, reliable verification would be carried out at all stages using national technical means and international forms of verification, including on-site inspection if necessary.

Experience in negotiations on arms limitations shows that when there is a genuine wish to agree, verification is not an obstacle. The legal obligation of a state that has concluded an agreement is in itself a guarantee that it will take measures to prevent violations of the agreement.

A20.6(G86)

A20.6(G86)

Proposal Abstract A20.6(G86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - comprehensive test ban
- (c) Regional arms control - outer space
- (d) Conventional weapons - ground forces

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
- (d) International control organization

3. Source:

Lebedev, Soviet Major General Yuriy V. Die Welt, (12 August 1986).

4. Summary:

The article questions why a verification procedure should be formulated if there is no agreement on the subject matter of verification. The Soviet Union's approach to verification is essentially that disarmament without verification is impossible and verification without disarmament is senseless. The main objective of verification is contributing to limitation of the arms race and to observance of specific requirements formulated as a result of the negotiations.

Verification should not curtail state sovereignty. The Soviet Union advocates verification by national technical means which have already proven their reliability and effectiveness in practice. However, in applying specific agreements the Soviet Union is willing to expand verification measures to include on-site inspections. For example, the Soviet Union has unilaterally renounced nuclear testing and has supported the idea of an international verification system and has expressed readiness to accept on-site inspections.

The Soviet Union is against the development, testing and deployment of space weapons, proceeding from the view that as long as there are no weapons in space, a ban on weapons would be easy to verify. The Soviet Union rejected the US proposal for "open laboratories" because it violates the principle of banning production of space weapons. The Soviet Union proposed that laboratories be opened to inspection with the goal of checking that the sides did not work on the development of space weapons.

The Soviet Union respects all international agreements and is no less interested than the United States in having effective verification. It is ready to implement verification by national technical means as well as by on-site inspections. Verification must

concern real agreements whose content has to be consistent with the necessary verification measures. Verification without formulating concrete arms limitation measures does not make sense.

The Warsaw Pact countries submitted a program on the mutual reduction of forces and weapons in Europe from the Atlantic to the Urals. Besides measures to verify the reduction process proper, the suggestion has been made to verify the military activities of troops that are left following the reduction. For the verification of force reductions and on-site inspection of the liquidation or stockpiling of arms, a representative of an international consultative commission could be called in. The author claims that the position of the United States and some of its allies would deliberately separate the problem of verification from the essence of the sides' concrete obligation to reduce their forces and weapons.

The author highlights the statement by M.S. Gorbachev to the 27th Congress of the CPSU: "I want to note the verification problem, to which we attach special importance. We have stated repeatedly that the USSR is receptive to verification and that we are no less interested than others. An all encompassing, very accurate verification is probably the most important element of the disarmament process."

A20.7(G86)

A20.7(G86)

Proposal Abstract A20.7(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

(a) Verification - general

(b) On-site inspection - selective

3. Source:

Czechoslovakia. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422/Add.1, 18 September 1986. See also: - Abstract A19.2(I85)

4. Summary:

Czechoslovakia's approach to verification is based on the principle that the form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement. The main task of verification is to safeguard strict compliance with the agreed measures and to strengthen mutual confidence and the security of the respective contracting parties.

Czechoslovakia supports the use of both national and international verification procedures, including on-site inspection. Other measures can also be elaborated. Measures of control and verification should in no way become an instrument of interference in internal affairs or harm the security of any of the parties concerned.

A20.71(G86)

A20.71(G86)

Proposal Abstract A20.71(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) On-site inspection - general
- (c) Remote sensors - satellite
- (d) International exchange of information
- (e) International control organization

3. Source:

Finland. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422/Add.1, 18 September 1986. See also: - Abstract A19.2(I85)

4. Summary:

Verification of arms control and disarmament should be fair, balanced, non-discriminatory and clear in its intent and procedures. Strict and effective international control implemented by an international disarmament organization created within the framework of the UN with assured unrestricted access without veto to all places as necessary for the purposes of verification, should be the final objective of the endeavours of all Member States of the UN.

Since the technological capabilities for effective verification by national technical means are not widespread and the results not readily shared, the international community should search for complementary alternatives on a voluntary basis. One such possibility could be the creation of a verification data based compiled and managed by the UN. Members would be invited to contribute to this data base a wide range of information pertaining to arms control and disarmament starting from national military expenditures.

The establishment of a data base centre within the auspices of the UN could be strengthened by the creation of an international satellite monitoring agency. The credibility of such a verification supporting data base could be further enhanced by UN observers and inspection teams empowered with sufficient rights to obtain and gather relevant information wherever they might be operating. Another worthwhile supporting step to consider could be the conducting of UN-sponsored seminars and conferences on verification methods and techniques.

A20.72(G86)

A20.72(G86)

Proposal Abstract A20.72(G86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - comprehensive test ban
- (c) Regional arms control - outer space
- (d) Chemical weapons

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On site inspection - selective

3. Source:

Ukrainian Soviet Socialist Republic. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General", Document A/41/422/Add.1, 18 September 1986.
See also: - Abstract A19.2(I85)

4. Summary:

The main purpose of verification in arms limitation and disarmament is to give the parties to an agreement effective assurance that they obligations they have assumed will be scrupulously respected. The crucial features of any such agreement are the specific measures on arms limitation and reduction. Verification plays an auxiliary role. Verification must be appropriate: it must be fully consistent with the scope and nature of the limits and other provisions in the agreement.

The preponderant role in verification belongs to national technical means of verification. When necessary, these can be supplemented by other measures, even on-site inspections, in order to enhance their effectiveness. Verification measures must not become a vehicle for interfering in the internal affairs of a party or jeopardizing its interests.

There are no insuperable obstacles to the verification of a nuclear test ban with national technical means and, where necessary, international procedures. Abandonment of the manufacture, testing and deployment of space strike weapons will require rigorous monitoring, including the opening of laboratories for inspection. Systematic international checks, the principle means of international supervision over the destruction of chemical weapons in storage, the manufacture of super-toxic chemicals for permitted purposes, and the destruction or dismantling of chemical-weapon production facilities, will constitute key provisions of a future convention.

The principle guarantee of compliance with a treaty is the legal obligation incumbent upon the state concluding it.

A20.8(G86)

A20.8(G86)

Proposal Abstract A20.8(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

United States. [Response to UNGA Resolution 40/152(0)]. In: United Nations, Secretary General, "Verification in all its aspects: Report of the Secretary General". Document A/41/422/Add.2, 14 October 1986.

4. Summary:

It is essential that arms limitation or disarmament agreements provide for arrangements enabling each of the parties to have confidence that every other party is abiding by its commitments. Verification of arms control agreements serves a number of more specific purposes:

- (1) Verification builds confidence in the viability of agreements by providing evidence that the obligations assumed are in fact being fulfilled.
- (2) Verification measures that provide for the investigation of ambiguous situations may reduce tensions and doubts regarding the viability of an agreement.
- (3) Verification helps deter violations of an agreement by increasing the risk of detection and complicating schemes of evasion.
- (4) When violations are detected through verification, other parties have the opportunity to assess the effects on their security and to take appropriate and timely action in response.

Verification arrangements must rest, inter alia, on the following fundamental principles to be effective:

- (1) The nature and extent of the arrangements should be governed by the requirements for determining compliance with the provisions of the agreement.
- (2) Verification measures should provide assurance not only that the agreed limitations or reductions are carried out but also that the resulting residual levels of forces or armaments are not exceeded, restructured or redeployed in a manner inconsistent with the agreement.
- (3) Verification measures should have the capability of detecting covert or other activities contrary to the agreement.

The willingness of a state to accept effective verification reflects its assessment of the value of the substance and durability of the arms control measure being envisaged. As compliance can be determined only by verification, it follows that, while specific verification arrangements are to be developed and agreed to by the states directly concerned, the very principle that arms limitation and

disarmament agreements should be effectively verifiable also serves the interests of the international community at large.

The primary obstacle to reaching agreement on effective verification is not the lack of the necessary procedures and techniques. The difficulty lies in the fact that some states have been unwilling to accept arrangements that would give the principle of verification truly practical meaning.

A20.9(G86)

A20.9(G86)

Proposal Abstract A20.9(G86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) Verification - general
- (b) On-site inspection - selective

3. Source:

Bulgaria. Statement in the First Committee of the 41st Session of the UN General Assembly, 20 October 1986. Document A/C.1/41/PV.12, 28 October 1986.

4. Summary:

Bulgaria feels that a political decision on the part of states to assume certain obligations under specific agreements logically presupposes that these obligations will be strictly and faithfully observed. However, this does not obviate the need for effective verification measures. Verification measures are multifunctional and are designed to build trust among states and mutual confidence in the compliance by all parties with the agreements, to contribute to strengthening and implementing the latter and to ensure faithful information about the real situation with respect to their implementation.

The socialist countries are open to verification and are ready on a mutual basis to accept it in all its forms and methods, should this be necessitated by specific disarmament agreements. Verification must apply to the implementation of real disarmament measures and to the observance of specific agreements in this area.

Verification cannot be viewed in the abstract or be artificially singled out from the context of concrete agreements. It is illogical to first set rules for verification and then adjust the scope and nature of the disarmament measures. Verification must be adequate, i.e., there must be proportionality between verification measures and the arms limitation and disarmament measures. There must not be undue interference in the internal affairs of states or jeopardizing of their economic and social development.

Verification should be based on the principles of equality of the parties in their rights and obligations under agreements as well as the equality and undiminished security of states and should be elaborated in accordance with the basic principles of international law. Bulgaria attaches great importance to the need for disarmament agreements to provide for the participation of the parties in the verification process either directly or through the UN system and other mechanisms on an equitable and nondiscriminatory basis.

Verification systems for practical disarmament measures could include a wide range of verification methods and procedures such as

national technical means and international procedures, including on-site inspections, with additional verification methods to be formulated, if necessary. Verification measures should be based on co-ordination and cooperation among states.

It is hardly possible or advisable to develop a general standard verification system. The general verification principles adopted during the Tenth Special Session of the General Assembly can serve as a basis for elaborating concrete verification measures in various agreements on disarmament.

A20.91(G86)

A20.91(G86)

Proposal Abstract A20.91(G86)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Conventional weapons - ground forces
- (c) Nuclear weapons - ballistic missiles
 - comprehensive test ban
- (d) Chemical weapons - destruction of facilities
- (e) Regional arms control - outer space

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) On-site inspection - selective
- (d) Seismic sensors - international network
- (e) International exchange of information

3. Source:

Union of Soviet Socialist Republics. Statement in the First Committee of the 41st Session of the UN General Assembly, 22 October 1986. Document A/C.1/41/PV.16, 29 October 1986.

4. Summary:

At the Reykjavik meeting, having expressed its willingness to go ahead with deep cuts in nuclear weapons, the USSR favoured not only the strictest possible verification in any form, but also toughening the requirements for it. In a post-nuclear situation, verification must be all embracing and of the kind that would provide full assurance of reliable compliance with agreements during every stage of arms reduction.

In Stockholm (see C124(T86)), the Soviet Union materialized in practice its new approach to verification issues thereby confirming that today the problem of verification as such does not exist, provided there is an earnest intention to seek mutually advantageous solutions which would lead to the lessening and elimination of the military danger. In their initiative for a sizeable reduction of conventional forces and armaments in Europe the USSR and its allies advocate reliable verification at all stages of that process. It may involve both national technical means and international forms of verification including, wherever necessary, on-site inspection.

In its proposals for a complete elimination of nuclear weapons, the verification of armaments being destroyed and limited would be carried out through national technical means and international procedures, up to and including in-site inspections. The USSR is ready to negotiate any other additional measures of verification.

The Soviet Union favours strict verification of the prohibition of nuclear weapon tests, is ready to support the proposals advanced by the countries of five continents in regard to the monitoring of compliance and is ready to accept the recommendations worked out under the auspices of the UN. It has put forward concrete proposals on seismic verification and is in favour of conducting more profound research in the field of international exchange of seismic data with the objective of enhancing the effectiveness of such exchange. It has proposed that a system for the expeditious transfer of Level II seismic data be worked out and tested.

If an agreement prohibiting the introduction of arms into outer space is reached, the Soviet Union is prepared to open its laboratories, on a reciprocal basis, for verification of such an agreement.

In April 1986 the USSR introduced additional far reaching proposals designed to ensure effective verification of the destruction or the dismantling of chemical weapon production facilities, and also proposed that a provision be made for carrying out systematic on-site inspections of those facilities as well. Systematic international on-site inspections will become the major form of international verification of compliance with the key provisions of a future prohibition of chemical weapons.

The Soviet Union's approach to the questions of verification is based on its willingness to adopt any reasonable measures that promote arms limitation. When there is genuine willingness to come to agreement, verification presents no obstacle.

The Soviet Union stands for strict compliance with the obligations under the agreements concluded and for preserving everything positive that has been achieved so far in the field of arms limitation under an effective control.

A20.92(I86)

A20.92(I86)

Proposal Abstract A20.92(I86)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

Verification - general

3. Source:

United Nations. General Assembly. "Verification in all its aspects." Resolution 41/86(Q), 4 December 1986.
See also: - Abstract A19.2(I85)

4. Summary:

This resolution was adopted without a vote. It differs to some extent from UNGA resolution 40/152(O) adopted the previous year. It is reproduced below in its entirety:

The General Assembly,

Recalling its resolution 40/152 O of 16 December 1985,

Conscious of the urgent need to reach agreements on arms limitation and disarmament measures capable of contributing to the maintenance of peace and security,

Convinced that, if such measures are to be effective, they must be fair and balanced, acceptable to all parties, their substance must be clear and compliance with them must be evident,

Noting that the importance of verification of and compliance with agreements is universally recognized,

Reaffirming its conviction, as expressed in paragraph 91 of the Final Document of the Tenth Special Session of the General Assembly, adopted by consensus at that session, its first special session devoted to disarmament, that in order to facilitate the conclusion and effective implementation of disarmament agreements and to create confidence, States should accept appropriate provisions for verification in such agreements,

Reiterating its view that:

(a) Disarmament and arms limitation agreements should provide for adequate measures of verification satisfactory to all parties concerned in order to create the necessary confidence and to ensure that they are being observed by all parties,

(b) The form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement,

(c) Agreements should provide for the participation of parties directly or through the UN system in the verification process,

(d) Where appropriate, a combination of several methods of verification as well as other compliance procedures should be employed,

Recalling that:

(a) In the context of international disarmament negotiations, the problem of verification should be further examined and adequate methods and procedures in this field should be considered,

(b) Every effort should be made to develop appropriate methods and procedures that are non-discriminatory and the do not unduly interfere with the internal affairs of other States or jeopardize their economic and social development,

Believing that verification techniques should be developed as an objective means of determining compliance with agreements and appropriately taken into account in the course of disarmament negotiations,

(1) Calls upon Member States to increase their efforts towards achieving agreements on balanced, mutually acceptable, comprehensively verifiable and effective arms limitation and disarmament measures;

(2) Takes note with appreciation of the report of the Secretary General¹ containing the views and suggestions of Member States on verification principles, procedures and techniques, and encourages all States that have not already done so to communicate to the Secretary-General, not later than 31 March 1987, their views and suggestions on verification principles as invited by the Assembly in its resolution 40/152 O;

(3) Urges individual Member States and groups of Member States possessing verification expertise to consider means by which they can contribute to, and promote the inclusion of, adequate verification measures in arms limitation and disarmament agreements;

(4) Requests the Disarmament Commission to consider at its 1987 session, in the context of pursuing general and complete disarmament under effective international control, verification in all its aspects, including principles, provisions and techniques to promote the inclusion of adequate verification in arms limitation and disarmament agreements and the role of the United Nations and its Member States in the field of verification, and to report on its deliberations, conclusions and recommendations to the General Assembly at its forty-second session in 1987;

(5) Requests the Secretary-General to prepare for the Disarmament Commission at its substantive session in 1987 a compilation of the views received from Member States on this issue;

(6) Decides to include in the provisional agenda of its forty-second session the item entitled "Verification in all its aspects" under the item entitled "Review of the implementation of the recommendations and decisions adopted by the General Assembly at its tenth special session: implementation of the recommendations and decisions of the tenth special session".

¹ A/41/422 and Add.1 and 2.

Proposal Abstract A21(A85)

1. Arms Control Problem:

- (a) Regional arms control - Europe
 - Middle East
- (b) Conventional weapons - ground forces
- (c) Nuclear weapons - ballistic missiles
 - proliferation
- (d) Chemical weapons - production
 - stockpiling

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors - satellite
 - aerial
- (c) On-site inspection - selective
 - IAEA safeguards
- (d) Short-range sensors - monitoring devices
- (e) Complaints procedure
- (f) International exchange of information

3. Source:

Symposium on Verification of Disarmament in Europe: Stockholm, 1985.
Stockholm: Swedish National Defence Research Institute, 1985.

4. Summary*:

The book reproduces the presentations and discussions at a symposium on "Verification of Disarmament in Europe" organized by the Swedish National Defence Research Institute and held in Stockholm on August 19-22, 1985. The purpose of the symposium was to stimulate interdisciplinary discussions on verification issues related to:

- (1) Technical methods of verification and compliance; problems and prospects;
- (2) Political, military and legal aspects of verification and compliance processes.

Particular emphasis at the symposium was placed on the Conference on Confidence- and Security-Building Measures and Disarmament in Europe.

Included in the volume is a Review of Discussions held in the plenary meetings at the symposium. In addition, the following presentations are included:

Michael Krepon. "Verification of Disarmament in Europe: Learning from Past Negotiating Experience."

Istvan Koremندی. "Alternative Verification Models for CSBMs in Europe."

* The book was received too late to permit detailed abstracts of its contents to be written.

Ensio Siilasvuo. "Verification Activities in UNEF II in Sinai."

Bengt Wallroth. "Experience from Observer Participations at the Swedish Manoeuver 'VASTGRANS 1985'."

Adolf von Baeckmann. "IAEA Safeguards on Peaceful Utilization of Nuclear Energy."

Johan Lundin. "Verification of a Comprehensive Ban on Chemical Weapons."

Jonathan Dean. "Verifying Force Reductions and Confidence-Building Measures."

John Borawski. "Political and Legal Dimensions of Assuring CSBM Compliance in Europe."

Adam Rotfeld. "Arms Control, Verification and CSCE-Process."

Lynn Hansen. "The Political and Practical Dimensions of Verifying Confidence- and Security-Building Measures."

Johan Tunberger. "A Practical Approach to Verification of CSBMs."

Milutin Civic. "Verification of Disarmament in Europe."

A22(A84)

A22(A84)

Proposal Abstract A22(A84)

1. Arms Control Problem:

Regional arms control - outer space - ASATs

2. Verification Type:

Verification - general

3. Source:

Slocombe, Walter. "Approaches to an ASAT Treaty". In Space Weapons: The Arms Control Dilemma, pp. 145-155. Edited by Bhupendra Jasani. London: Taylor and Francis, 1984.

4. Summary:

In response to a growing anti-satellite (ASAT) weapon threat and insufficient legal restrictions on ASAT weapons, a treaty preventing the use, testing or deployment of ASAT weapons and/or requiring the dismantling of existing systems would be desirable. However, verification of such a treaty would be difficult because of the small size of ASAT systems and because the launchers used for current systems (ICBMs in the Soviet case and F-15 interceptors in the case of the US) have many non-ASAT uses. Effective concealment of even a few operational ASAT systems could yield a significant military advantage. Verification might also be hampered by an unclear boundary between permitted and prohibited activities since ASAT operations merely require that one space object be brought into proximity with another. Detection and regulation of research activities concerning potential ASAT application would be difficult, too. Ultimately, inadequate verification might need to be compensated for by efforts to ensure the survivability and redundancy of crucial satellite systems or by reliance on the probability that ABM systems and 'civil' space programmes put to use in ASAT warfare would not be reliable for a 'high confidence, low escalation attack' on critical satellites.

A22.1(A84)

A22.1(A84)

Proposal Abstract A22.1(A84)

1. Arms Control Problem:

Regional arms control - outer space - ASAT

2. Verification Type:

Verification - general

3. Source:

United States. President. Report to the Congress on US Policy on ASAT Arms Control. Washington: US Government Printing Office, 1984.

4. Summary

Any ban on ASAT systems must be verifiable. In general, verification of arms control agreements suffers from the asymmetric degree of openness between the US and the USSR. This problem is aggravated for ASATs because the satellites upon which US and Allied security depends are few in number. Consequently, even small-scale cheating could pose a disproportionate risk to the US. In this regard the USSR would find it far easier to verify US compliance on ASAT limitations than would the US. The Soviet interceptor is relatively small and its launcher is used for other space missions. The Soviet Union could maintain a covert supply of interceptors ready for quick use, probably without risk of US detection. Launch vehicles could be diverted from other missions.

Tests on ground-based laser ASATs could be concealed. Also, determining whether an object in orbit has been damaged could be extremely difficult in practice and determining the source of the damage perhaps impossible. It is also difficult, perhaps impossible, to determine whether an orbiting satellite contains a weapon.

There are additional problems concerning the verification of limits on ASAT testing. The wide variety of ASAT systems and the fact that an ASAT capability can be a by-product of other systems, create problems in identifying what testing is prohibited. A comprehensive testing limit is impossible to verify given that ASAT capabilities are inherent in some systems developed for other missions or are amenable to surreptitious development. More limited test bans may be verifiable and these are being studied to see if they are in the US national interest. The breakout potential of some ASAT systems creates doubt that limited test bans could be effective.

These verification difficulties could, in some cases, be mitigated by future technological developments or by cooperative measures. Such possibilities are being studied.

A23(A77)

A23(A77)

Proposal Abstract A23(A77)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles

2. Verification Type:

Verification - general

3. Source:

Stockholm International Peace Research Institute. Strategic Disarmament, Verification and National Security. London: Taylor and Francis Ltd., 1977.

4. Summary:

This book examines the relationship between security and verification needs for two countries undergoing strategic disarmament. Chapter 2 provides an overview of verification including a discussion of the definition of verification. The definition proposed by the study is:

A process, specifically established or approved by a disarmament agreement, carried out by individual state parties to the agreement, either reciprocally or not, or by an international body established or empowered to carry out the process, by personnel or by technical means, in order to determine the degree to which the parties to the agreement have implemented its provisions and thereby observed or discharged their obligations under the treaty (pp. 13-14).

Chapter 2 also reviews the literature on verification and suggests a typology of methods which classifies them according to: (a) degree of internationalization; (b) the degree and kind of access to the territory of the state being verified; (c) the object and scope of the disarmament measure; and (d) the stage of the agreement at which verification is utilized.

The following requirements for verification are also discussed: (a) technical feasibility; (b) technical sufficiency below which level verification cannot function effectively; (c) detectability of the object of the agreement to be verified; (d) a continuous flow of information from the verification system; (e) timeliness (i.e. promptness); (f) confidentiality of information acquired by national technical means; (g) flexibility to cope with technical changes; (h) economic acceptability; (i) legal requirements; (j) military security requirements to detect violations which could bring a military advantage to the violator; and (k) political requirements which originate from the internal political needs of states.

The functions of verification include: (a) gathering information; (b) providing assurance that security is not being threatened; (c) establishing a channel of communication to allow the resolution of disputes before they become serious; (d) creating a

precedent for future, more extensive, verification procedures; and (e) being a mechanism for distinguishing between major and minor violations.

In Chapter 3 the authors consider the conditions for implementation of disarmament agreements other than verification. National interests and national security and their relationship with disarmament are discussed in Chapter 4. Chapter 5 looks at security through stable deterrence and Chapter 6 unites security and verification concerns in a hypothetical "case study" of strategic arms limitation.

The study challenges the assumption that there is a direct relationship between the verification of disarmament and security. If strategic military security for two states is defined as the mutual ability to deter the opponent from launching a nuclear attack, then reductions in nuclear weapons do not cause diminished security until the very last stages of disarmament. As a result, verification does not need to be increased as weapons are reduced. Requirements for verification depend on the strategic context. Unrestricted and unverified technology, not disarmament, causes diminished security. Verification, therefore, is more important for constraining technological arms developments than for counting numbers. Verification, in this regard, is crucial for maintaining security during disarmament.

A24(G79)

A24(G79)

Proposal Abstract A24(G79)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles

2. Verification Type:

(a) Verification - general

(b) Remote sensors

3. Source:

United States. Congress. Senate Select Committee on Intelligence. Principle Findings on the Capabilities of the United States to Monitor the SALT II Treaty. Washington: U.S. Government Printing Office, October 1979.

4. Summary:

The findings of this committee are prefaced by an admission that verification cannot provide absolute certainty on compliance issues. US monitoring capabilities are very good and have improved dramatically in recent years, but this is countered by the Soviet Union's continued concealment and deception practices. Thus, the US must anticipate and respond aggressively to Soviet violations, operating on the belief that the Soviets will press home any advantage gained in the negotiating process.

Having investigated the influence of monitoring capabilities on the US negotiating position, it is concluded that the provisions of SALT II reflect a strong concern for the verification requirements of the agreement. Problems arise only where ambiguous provisions are included to allow for some flexibility in remaining weapons programs. It is recommended that an emphasis on verification as a high priority must be maintained however, and funding should be increased to allow continued technological improvements in data processing and analysis. A greater consideration of Soviet SALT negotiating strategy is also called for to provide a more competitive and rigorous negotiating stance. Lastly, it is suggested that the committee itself should in future be kept fully informed on all monitoring data for the SALT II treaty to provide the will and determination to back up the verification process and treaty enforcement.

The monitoring capability of the US will provide "high to high moderate confidence" that counting provisions have not been violated (p. 4). Qualitative provisions are much more difficult to verify, but even here, most can be monitored with high to moderate confidence. The latter function is dependent on numerous verification systems to ensure compliance, and some provisions will remain which can only be verified with a low degree of confidence. "Overall, the Committee finds that the SALT II treaty enhances the ability of the United States to monitor components of Soviet strategic weapons forces..." (p. 5).

A25(A81)

A25(A81)

Proposal Abstract A25(A81)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles
- cruise missiles
- manned aircraft
- missile tests
- mobile ballistic missiles
- reentry vehicles

2. Verification Type:

Verification - general

3. Source:

Carnesale, Albert. "The Adequacy of SALT Verification". In Intelligence Policy and National Security, pp. 157-160. Edited by Robert Pfaltzgraff, Jr., Uri Ra'anani and Warren Milberg. London: Macmillan, 1981.

See also: Perle, Richard. "SALT II: Who Is Deceiving Whom?" In Intelligence Policy and National Security, pp. 148-156. Edited by Robert Pfaltzgraff Jr., Uri Ra'anani and Warren Milberg. London: Macmillan, 1981 (see abstract A26(A81)).

4. Summary:

The author disagrees with Perle's standard of verification under which the possibility of any cheating would render an arms control agreement unacceptable. Carnesale argues that "a reasonable guideline for 'adequacy' of verification is far more in our interest than any clearly unattainable theoretical standard" (p.158). An arms control agreement, he argues, should be considered as a package in which some provisions are more verifiable and advantageous than others. The Soviets may still have greater access to information about American strategic forces and programmes than vice-versa, but the SALT agreements close the "information gap" somewhat. In some instances, American intelligence requirements exceed verification requirements. With regard to missile flight tests, for example, national intelligence would benefit from information on accuracy and reliability (which are not constrained by SALT), but this is not necessary for verification. These two types of requirements should not be confused.

Even though perfect verification of limits on deployment of new ICBMs and the production of mobile ICBMs is not possible, these provisions are clearly in the American interest so they should be retained. Similarly, constraints on the upgrading of the Backfire bomber are preferable to no constraints, even if they are not perfectly verifiable.

A26(A81)

A26(A81)

Proposal Abstract A26(A81)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles
- cruise missiles
- manned aircraft
- missile tests
- mobile ballistic missiles
- reentry vehicles

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors

3. Source:

Perle, Richard. "SALT II: Who is Deceiving Whom?" In Intelligence Policy and National Security, pp. 148-156. Edited by Robert Pfaltzgraff Jr., Uri Ra'anana and Warren Milberg. London: Macmillan, 1981.

See also: - Abstract A25(A81)

4. Summary:

Perle specifies a "reasonable standard" for verification (p. 153): that cheating be detectable. According to this standard, the SALT II treaty contains "major provisions" that cannot be verified. Specifically, the limits on the deployment of new types of ICBMs cannot be verified. An ICBM is deemed to be 'new' if its critical parameters such as launch weight, throw-weight, length and diameter differ by more than 5 percent from the parameters of missiles which have already been tested or deployed. Verification to within 5 percent using national technical means is not possible. The loss of intelligence facilities in Iran has considerably weakened American verification capabilities, but verification of deployment of new types of ICBMs would not have been possible even with those facilities (or with new replacement facilities).

The United States cannot verify Soviet compliance with the range limit on ground and sea-launched cruise missiles. It is also impossible to verify: clandestine production of mobile ICBMs; the prohibition of the conversion of SS-20 missiles into SS-16 missiles, and improvements of the Backfire bomber.

Another factor weakens American verification capabilities: the nebulous dividing line between compliance and non-compliance. In this context, the costs to the Soviets of cheating would not be high. A verifiable treaty possesses three characteristics: 1) precise language which permits definitive judgments about compliance; 2) a reasonable expectation that necessary technical information will be available; and 3) provisions which permit the practical use at the political level of evidence of non-compliance. According to Perle,

"The SALT II Agreement fails on all three counts" (p.155). For example, since there is no agreement on the throw-weight of existing missiles, deviation from that parameter by more than 5 percent cannot be demonstrated as a case of non-compliance. The need for "intelligible" evidence such as reconnaissance photographs instead of "mathematical formulas that impute numerical values to reference data indicated by squiggles on an oscilloscope" (p.156) must be duly noted.

A27(A84)

A27(A84)

Proposal Abstract A27(A84)

1. **Arms Control Problem:**

- Nuclear weapons - ballistic missiles
 - manned aircraft
 - comprehensive test ban
 - nuclear freeze
 - missile tests

2. **Verification Type:**

- (a) Verification - general
- (b) On-site inspection - selective
- (c) Remote sensors
- (d) International exchange of information
- (e) Short-range sensors
- (f) Seismic sensors - intra-border stations

3. **Source:**

Slocombe, Walter. "Verification and Negotiation". In The Nuclear Weapons Freeze and Arms Control, pp. 80-87. Edited by Steven E. Miller. Cambridge, Mass.: Ballinger, 1984.

4. **Summary:**

Slocombe asserts that verifiability is an important criteria for any arms control agreement, including a nuclear freeze, because it is a domestic political necessity and because "the Soviets would violate the agreement if they thought they could gain an advantage by doing so" (p.81). He also suggests that, with regard to monitoring capabilities, verification is identical to intelligence. He explains that "our capacity to monitor for arms control verification is as good as it is because the information we need for arms control verification is the same information we need for general strategic intelligence purposes" (p.80).

Arms control agreements must be specific and each topic must be covered in adequate detail, except where ambiguity is desirable to permit flexibility. The latter case should, however, be the exception rather than the rule. Problems of definition will arise in any negotiations over a nuclear freeze. The issue of the Backfire bomber will recur, reviving the problem of defining exactly which Soviet and US theater aircraft have a nuclear role. Even if Backfires in the Soviet Air Force are limited automatically, the parties will still have to deal with the half of the total Backfire force that is part of the Soviet Navy. Some freeze proposals limit development tests, but permit crew training. These concepts will have to be clearly distinguished to separate tests which are permitted for crew training from those which are prohibited as part of improvement efforts. If

tests are to be limited by numerical quota, the parties will have to define what is a "test" and what is a "failure" which doesn't get counted for the quota.

Cooperative measures can enhance national technical means of verification. Such measures include: (a) data exchanges, (b) facilitating the use of national technical means, and (c) independent data acquisition. Data exchanges merely provide unconfirmed information which leads to uncertainties about the correctness of the information, but Soviet-provided data can still be useful because it can be used to demonstrate cheating if deployments beyond the stated levels are ever discovered. Slocombe notes that "in a freeze - whose focus is, by definition, on prohibiting change from a pre-existing base - such a system of explicit statement of the initial condition would be especially useful" (p.86). Measures which facilitate the use of national technical means of verification include: a ban on interference with national technical means (as in the SALT II agreement); a prohibition on deliberate concealment; advance notice of tests; declaration of distinctive features of limited and non-limited equipment; and identification of production facilities. Agreement on specific rules will be necessary to reduce disputes over these measures (as occurred over the encryption of telemetry, for example). Independent data not subject to Soviet control can be acquired through means other than national technical means, but these provisions will be hard to negotiate. Slocombe concludes that on-site inspection "is vastly over-rated for everything except the CTB" (p.86). The results of a nuclear explosion cannot be made to look like an earthquake, so on-site inspection could be useful for verifying a CTB, but on-site inspection is of little value to verify prohibited modernization of a missile, for example, by examining test reports. "Black boxes" which collect data passively are of greater utility than on-site inspection. The Soviets have agreed to accept national seismic stations (NSS) under a CTB, so such methods are more likely to be accepted than intrusive on-site inspections.

A28(G84)

A28(G84)

Proposal Abstract A28(G84)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles
- anti-ballistic missile systems

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) Complaints procedure - consultative commission

3. Source:

United States. Congress. Senate Committee on Armed Forces. "Statement of Hon. Richard N. Perle, Assistant Secretary of Defense (International Security Policy)." In Soviet Treaty Violations. 98th Congress, 2nd Session, March 14, 1984. Washington: US Government Printing Office 1984, pp. 2-9.

4. Summary:

The purpose of these hearings is to examine recent allegations of Soviet violations in order to determine their implications for military strategy and the arms control process. Richard Perle's opening statement is worthy of note as it considers some of the substantive issues in the debate over Soviet non-compliance.

Perle states that objections have been raised where allegations of Soviet violations have been publicized, but the substance of these reports has not been seriously challenged. The evidence was persuasive and thorough, but it fell short of the standard of legal proof, so that conclusions remained uncertain. Nonetheless, important military gains were made by the Soviets under both SALT I and II, as the latter allows much latitude even where parties comply with its provisions. Perle concludes that the treaty has not been in the security interests of the United States.

Perle goes on to review those violations listed in the 1984 Presidential Report, and notes that violations of the ABM treaty in particular posed a significant threat to US security. Soviet emplacement of radar which may be used in an ABM mode will give the Soviets a new, important capability, since they can easily acquire and employ all other components of an ABM system. Verification is also seriously impeded by Soviet evasive tactics which are in violation of SALT. Telemetry encryption in particular, "is a serious development because it affects our ability to negotiate a verifiable START treaty. It affects in space the prospect of a verifiable ASAT agreement" (p. 5). The US Administration's commitment to protect its national technical means of verification remains as strong as ever, and they may exercise remedies or withdraw from the treaty where this issue is not resolved satisfactorily.

Arms control agreements are becoming increasingly difficult to enforce, and few of the proffered solutions are feasible. The Standing Consultative Commission (SCC) is the designated forum for complaints on SALT issues, but so far it has been unable to resolve compliance issues. Some officials demand standards of proof that national technical means of verification simply cannot provide, while others choose to ignore violations that aren't militarily significant. This does not solve the problem however, as the Soviet Union continues to gain military advantages through its questionable activities. Whether or not these activities are violations or merely circumventions of the treaty, the result is the same; the United States faces a loss of security while the Soviet Union makes concomitant gains in military strength. It is clear that the Soviet Union is violating the spirit of the SALT agreements. Thus, greater care must be taken in formulating the wording of these agreements, with a scrupulous concern for the clarity of obligations. The United States must "see to it that such violations carry costs at least equal to the gains they derive from them" (p.9).

A28.1(G84)

A28.1(G84)

Proposal Abstract A28.1(G84)

1. Arms Control Problem:

Nuclear weapons - anti-ballistic missiles
- ballistic missiles
- cruise missiles
- partial test ban

2. Verification Type:

- (a) Verification - general
- (b) Complaints procedure - consultative commission

3. Source:

Union of Soviet Socialist Republics. Aide-Memoire to the United States of America. 29 January 1984. (Excerpts reproduced in Survival (May/June 1984): 129-131).

See also: United States of America. Reply to Soviet Aide-Memoire. 31 January 1984. (Excerpts reproduced in Survival (May/June 1984): 132-133).

4. Summary:*

The Soviet Union alleges the following:

- (1) The US did not fulfil the provision of SALT II "concerning the formulation of mutually acceptable solutions in respect of ... long-range sea- and land-based cruise missiles". This is not in accord with US statements of its intention to refrain from actions undermining existing strategic arms agreements.
- (2) By deploying Pershing II and GLCM in Europe the US violated the provisions of SALT II prohibiting circumvention of the treaty. These weapons are "an obvious addition to the strategic offensive arsenal of the US".
- (3) The US violated SALT I by its practice of using shelters over ICBM launchers. "Since the launchers of the Minuteman II missiles thus refitted do not differ in practical terms from the launchers of Minuteman III missiles, it can be conjectured that it is MIRVed Minuteman III missiles that are really deployed in those silos". If so, this violates SALT II.
- (4) With regard to the ABM Treaty, the following US activities constitute violations:
 - (a) The radar on Shemya Island, shelters over anti-missile launcher silos, work on mobile ABM radar systems and space-based radar systems, testing of Minuteman I ICBMs to give these missiles ABM capabilities, and the development of multiple warheads for ABM missiles.

* The following summary focusses on the accusations of violations to specific treaty commitments.

- (b) Construction of Pave Paws radar stations on the coasts of the US.
- (c) Announcement in March 1983 of plans to create a large-scale ABM system.
- (5) The US has also systematically violated the agreement to observe the confidentiality of discussion of "matters connected with the fulfilment of commitments on strategic arms limitation" and this is detrimental to the normal functioning of the Standing Consultative Commission.
- (6) The US has repeatedly exceeded the agreed 150 kt limit on underground nuclear tests "according to data on the possession of the Soviet side".
- (7) The Soviet Union has approached the US concerning the ejection of radioactive substances beyond the national territory of the US as a result of underground nuclear tests, in violation of the LTBT of 1963.
- (8) The US has acted inconsistently with the Helsinki Final Act by deploying new "first-strike nuclear missiles, the creation of conditions for substantial build-up of American troops in Europe and the continuing arming of these troops with means of mass annihilation..."

5. **Selected Comments by Other States:**

In its reply to the Soviet allegations, the US addresses each in detail, denying their validity. To begin with, ICBM shelters were used to protect construction from the weather. In response to Soviet concerns, modifications were made to the shelters whose use was discontinued in 1979.

Concerning the SALT II Protocol on SLCM and GLCM, American actions were in compliance with all provisions of the Protocol during the period it would have been in effect. (It would have expired on 31 December 1981). When it signed SALT II, the US made it clear it would not agree to an extension of the Protocol.

The radar on Shemya Island is for national technical means of verification. The Pave Paws radars are ballistic missile early warning radars located on the periphery of national territory and oriented outward as permitted by the ABM Treaty.

The Pershing II and GLCM are not land-based strategic ballistic missiles within the definition of the SALT II Agreement since their range is less than 5500 km. The US made it clear during SALT II negotiations and after the signing of the treaty that the non-circumvention provisions would not alter "existing patterns of cooperation with our allies or preclude transfer of systems and weapons technology..."

The US denies that it has conducted nuclear tests exceeding the 150 kt threshold. It also denies that Minuteman II silos have been converted to Minuteman III launchers. Any launchers of Minuteman II ICBMs converted to Minuteman III ICBMs will be distinguishable on the basis of externally observable design features as required by SALT II.

The US has not made public the proceedings of the SCC and is properly discharging its responsibilities under the regulations of that body.

The US affirms that all its actions are in full compliance with undertakings in the Helsinki Final Act.

Both the USSR and US have conducted underground nuclear tests resulting in the venting of some radioactive material. Over the past decade there has only been one American incident of local and minor venting.

Finally, the ABM Treaty does not prohibit research and both sides have research programs.

A29(A85)

A29(A85)

Proposal Abstract A29(A85)

1. Arms Control Problem:

- (a) Nuclear weapons - ballistic missiles
- (b) Conventional weapons - ground forces
- (c) Regional arms control - Europe

2. Verification Type:

Verification - general

3. Source:

Darilek, Richard E. "Political Aspects of Verification: Arms Control in Europe". In A Proxy for Trust: Views on the Verification Issue in Arms Control and Disarmament Negotiations, pp. 65-74. Edited by John O'Manique. Ottawa: Norman Paterson School of International Affairs, Carleton University, April 1985.

4. Summary:

This article considers the three fundamental purposes of verification and their potential relevance in the European context. The Intermediate Nuclear Forces (INF), Mutual Balanced Force Reductions (MBFR), and Confidence and Security Building Measures (CDE) negotiations are each examined in terms of their detection, deterrence and confidence-building capabilities. This framework for analysis allows for some judgment on major issues in verification and provides some general observations on verification and arms control in Europe.

In terms of detection, it is noted that any agreement on INF will be easily verifiable insofar as it is relatively easy to monitor the deployment of Soviet SS-20s. Detection of violations would be more difficult with regard to the smaller, more mobile short-range missiles, and may be further complicated by the US requirement for more stringent 'effective' verification. It is interesting to note that the standard of proof required for arms control is much higher than that which is deemed sufficient for force modernization decisions.

It is stated that the detection of violations of any MBFR agreement will require more intrusive methods of verification which could prove to be a significant obstacle in arms control.

The central issues pertaining to the deterrent function of verification are pinpointed - these are its sufficiency in actually deterring a violation and more importantly, the appropriate response to actual violations. Officials are often reluctant to challenge the behaviour of a negotiating partner since this might place the entire agreement in jeopardy. Conversely, an unwillingness to respond to violations will undermine the deterrent effect of any agreement. Thus, the outcome here depends on the willingness of governments to act upon evidence of suspected violations.

Finally, the ability of verification measures to foster confidence is explored. The scope and nature of an agreement will in part determine the effectiveness of verification as a confidence-building measure, since less comprehensive or ambiguous agreements may not provide sufficient assurance to substantially improve confidence. The degree of confidence that one party may have will also be adversely affected by the sporadic compliance record of its partner - little confidence will be inspired where previous agreements have been consistently abrogated.

A30(A85)

A30(A85)

Proposal Abstract A30(A85)

1. Arms Control Problem:

- (a) Nuclear weapons - ballistic missiles
 - manned aircraft
 - anti-ballistic missile systems
 - cruise missiles
 - missile tests
 - mobile ballistic missiles
 - reentry vehicles
 - partial test ban
- (b) Chemical and biological weapons - use

2. Verification Type:

- (a) Verification - general
- (b) Complaints procedure - consultative commission

3. Source:

Krepon, Michael. "The Political Dynamics of Verification". In Verification and Arms Control, pp. 135-151. Edited by William C. Potter. Lexington, Mass.: D.C. Heath and Company, 1985.

4. Summary:

This article places in historical perspective the differences between the approach of the Reagan administration to verification and compliance in arms control and the approaches of previous administrations. Between 1963 and 1979, American presidents supported a flexible approach to verification which was articulated as "adequate" verification. In this approach, less than complete assurance could be tolerated because there would be no significant risk to national security created by undetected cheating. Cheating on a large scale which would alter the strategic balance would be readily detected. The Reagan administration, however, introduced the concept of "effective" verification which remained undefined, but was presumed to be tougher than the previous standard.

Compliance diplomacy practiced by American administrations between 1973 and 1979 was quite accommodating. The Standing Consultative Commission (SCC) established by the SALT I Agreement was the forum in which this diplomacy was conducted. The author writes that "the SCC succeeded in ironing out compliance questions during the Nixon, Ford and Carter administrations because neither side questioned the other's basic intentions toward the SALT agreements" (p. 145). This approach can be contrasted with the skeptical view of the Reagan administration which anticipates that Soviet violations will occur when the Soviets believe that violations would gain more for them than the SALT process. Doubts about SALT compliance were enhanced by reports of Soviet chemical and toxic warfare activities. The Reagan

administration released a report on Soviet non-compliance with five arms control agreements in January 1984 before diplomatic channels had been exhausted but there was no attendant publicity and the allegations were made in conditional language. Nonetheless, this action signified the inability of the Reagan administration to resolve compliance issues within the SCC, a problem not shared by other administrations. Furthermore, since the US pledged to uphold its arms control obligations, the absence of a "coherent strategy to deal with compliance issues constrains US options more than Soviet misbehaviour does" (p. 149).

A31(A85)

A31(A85)

Proposal Abstract A31(A85)

1. **Arms Control Problem:**

Nuclear weapons - ballistic missiles
- manned aircraft
- anti-ballistic missile systems
- cruise missiles
- missile tests
- mobile ballistic missiles
- reentry vehicles
- partial test ban

2. **Verification Type:**

Verification - general

3. **Source:**

Lowenthal, Mark M. and Joel S. Wit. "The Politics of Verification". In Verification and Arms Control, pp. 153-168. Edited by William C. Potter. Lexington, Mass.: D.C. Heath and Company, 1985.

See also: Lowenthal, Mark M. and Joel S. Wit. "Politics, Verification and Arms Control". Washington Quarterly 7, no. 3 (Summer 1984): 114-125.

4. **Summary:**

The authors point out that, in evaluating allegations or cases of non-compliance with arms control agreements, there are two significant criteria: military significance and political significance. Military significance refers to the narrow realm of military advantage gained from cheating by acquiring prohibited weapons systems or quantities of forces. Political significance refers more broadly to the intentions of the non-complying party. In the politicized debate over arms control, two schools of thought have emerged. "Strict constructionists" emphasize political significance over military significance whereas "loose constructionists" do the reverse. A centrist position is notably absent in the current debate. Such a position would suggest that even though verification can never be perfect, violations or ambiguous behaviour will not be overlooked and must be accounted for.

The authors call for a national consensus on verification in terms of both internal policy goals and external limits. This would permit an American administration to raise compliance issues and obtain a satisfactory response without fearing that pressure for progress in arms control would act against the need to effectively address Soviet actions. This could be accomplished by developing public support through wider dissemination of information. The proceedings of the Standing Consultative Commission should be made public (although they need not be reported in great detail) to show

that compliance issues have been and can be resolved in that forum. More information would also show that most cases of non-compliance are ambiguous and therefore not as clear cut as the strict constructionists would have us believe nor as inconsequential as the loose constructionists would suggest. Another objective should be to seek less comprehensive arms control agreements, like the Limited Test Ban Treaty, which do not pose the same verification obstacles as do other, more complex, agreements.

A32(A81)

A32(A81)

Proposal Abstract A32(A81)

1. **Arms Control Problem:**

Nuclear weapons - cruise missiles

2. **Verification Type:**

Verification - general

3. **Source:**

Quester, George H. "Arms Control: Toward Informal Solutions". In Cruise Missiles: Technology, Strategy, Politics, pp. 275-307. Edited by Richard K. Betts. Washington, D.C.: The Brookings Institution, 1981.

4. **Summary:**

Quester points out that it is difficult to verify cruise missiles because they can be fired from many different kinds of launchers. Monitoring of visible silos or specially-fitted submarines, a technique of verification used for other weapons, is not possible in the case of cruise missiles. Verification may become a burden for the United States when the Soviet Union catches up in cruise missile technology. Hence, it is necessary to search for new methods of monitoring. Functionally related observable differences (FRODs) may ease the problem somewhat, but verification with confidence does not seem likely in the 1980s.

A33(A83)

A33(A83)

Proposal Abstract A33(A83)

1. **Arms Control Problem:**
Nuclear weapons - cruise missiles
2. **Verification Type:**
Verification - general
3. **Source:**
Center for Defense Information. "The Cruise Missile Era: Opening Pandora's Box". The Defense Monitor 12, no. 4 (1983): 1-8.
4. **Summary:**
This issue of The Defense Monitor describes cruise missiles and analyses the proposed deployment in Europe. The article states that "the wide-scale deployment of long-range cruise missiles will pose near-insurmountable verification problems for the US and the USSR" (p.6). It adds that verification may not be possible without close physical inspection. The small size and mobility of cruise missiles and the similarity between conventional and nuclear-armed cruise missiles complicate the verification problem. For these reasons, the article concludes that "cruise missiles threaten an end to effective arms control" (p.8).

A34(A83)

A34(A83)

Proposal Abstract A34(A83)

1. **Arms Control Problem:**
Nuclear weapons - cruise missiles
2. **Verification Type:**
Verification - general
3. **Source:**
Sorrels, Charles. US Cruise Missile Programs: Development, Deployment and Implications for Arms Control. New York: McGraw-Hill, 1983.
4. **Summary:**

In Chapter 6 of his book Sorrels discusses the impact of cruise missiles on alliance relationships, stability in the nuclear balance and in arms control. After reviewing the attempts made in SALT II negotiations to incorporate cruise missiles into the agreement, Sorrels concludes that "the provisions of SALT II relating to cruise missiles include limitations that are difficult if not impossible to verify" (p. 161). He notes that it is impossible to verify the potential range of cruise missiles and to detect whether it is armed with a conventional or nuclear warhead. Special features such as unique pylons on an aircraft may facilitate counting of launchers, but internal loadings of cruise missiles on aircraft cannot be detected by external observation. Externally observable design features could be added to cruise missiles to indicate whether they are conventionally or nuclear armed in order to aid verification. Despite problems of verifiability, cruise missiles can contribute to realizing arms control objectives because they enhance crisis stability.

A35(A84)

A35(A84)

Proposal Abstract A35(A84)

1. **Arms Control Problem:**

- (a) Nuclear weapons - manned aircraft
- (b) Conventional weapons - aircraft

2. **Verification Type:**

Verification - general

3. **Source:**

Arkin, William. "Flying in the Face of Arms Control". Bulletin of the Atomic Scientists 40 (February 1984): 5-6.

4. **Summary:**

The verification of nuclear-capable tactical aircraft, their ranges and bomb loading poses a new problem for arms control agreements. A new US Air Force program to conceal the nuclear capabilities of its aircraft will exacerbate the problem. The program, known as "Weapons Storage and Security Systems" is designed to improve the survivability, security and safety of American aircraft in Europe. Nuclear bombs will be removed from current storage sites and alert areas and will be placed in 239 unmanned, underground vaults in the floor of European based F-4, F-16 and F-111 aircraft shelters. Nuclear bomb-capable aircraft will be protected in hardened shelters instead of being parked in highly visible, specially marked and guarded areas. This will reduce key indicators of dual capable aircraft nuclear alert status and will obscure intelligence signatures provided by the system. The installation of operational vaults is scheduled to begin in June 1987.

The expected increased use of nuclear capable aircraft contradicts predictions that deployments of Pershing II and cruise missiles would relieve aircraft from nuclear roles. This places urgency on the inclusion of aircraft in an arms control agreement. This issue was not acted upon in SALT I or SALT II. The US and USSR must establish common criteria and data on these aircraft so that they may be included in an arms control agreement.

A36(A84)

A36(A84)

Proposal Abstract A36(A84)

1. Arms Control Problem:

Nuclear weapons - research and development

2. Verification Type:

(a) Verification - general

(b) Complaints procedure - consultation and cooperation

3. Source:

Colby, William E. "Verification of a Nuclear Freeze". In The Nuclear Freeze and Arms Control, pp. 73-75. Edited by Steven E. Miller. Cambridge, Mass.: Ballinger, 1984.

4. Summary:

Colby concludes that a nuclear freeze treaty could be negotiated which would be both mutual and verifiable. Verification could be provided by America's "exceptional capabilities" and cooperative measures or restraints on Soviet behaviour. Colby notes that "the consultation process would be adequate to give us ample warning of any substantial program to violate a freeze on the production, development, or deployment of additional nuclear weapons" (p.75). He suggests that consultation procedures along the lines of those established by the Standing Consultative Committee of the SALT treaties would be essential to resolve suspected violations and thereby enhance intelligence collection facilities. There are also precedents for cooperative measures including agreements against concealment, declarations of forces, counting rules, test notification requirements, seismic or electronic sensors and even inspection teams which have been included in negotiated arrangements.

A37(G85)

A37(G85)

Proposal Abstract A37(G85)

1. Arms Control Problem:

- (a) Nuclear weapons - anti-ballistic missiles
 - ballistic missiles
 - missile tests
 - partial test ban
- (b) Chemical and biological weapons - production
 - use
- (c) Conventional weapons - ground forces

2. Verification Type:

- (a) Verification - general
- (b) Remote sensors
- (c) International exchange of information

3. Source:

United States Embassy. Ottawa, Canada. "'Pattern of Soviet Non-compliance' with Arms Accords Seen". (Press Release). Ottawa: 24 December 1985. (Containing: "President's Report (to Congress) on Soviet Noncompliance")

See also: - United States. President Ronald Reagan. Office of the Press Secretary. "The President's Unclassified Report to the Congress on Soviet Noncompliance with Arms Control Agreements". Washington: 1 February 1985.

- United States. Congress. House of Representatives Committee on Armed Services. Procurement and Military Nuclear Systems Sub-committee. Special Panel on Arms Control and Disarmament. Report. 98th Congress, 2nd session, December 28, 1984. Washington: US Government Printing Office, 1985. (Containing: General Advisory Committee on Arms Control and Disarmament. "A Quarter Century of Soviet Compliance Practices Under Arms Control Commitments: 1958-1983: Summary". October 1984).

- United States. President Ronald Reagan. "Message from the President of the United States Transmitting a Report on Soviet Noncompliance with Arms Control Agreements". Washington: US Government Printing Office, 23 January 1984.

4. Summary:

In 1984 and 1985 President Reagan submitted four reports to Congress on Soviet compliance issues. The first, in January 1984, reviewed seven issues and concluded that USSR had violated a number of arms control commitment.

The report of the independent General Advisory Committee on Arms Control and Disarmament submitted in September 1984 concluded that the Soviet Union had violated a substantial number of arms control commitments over a 25 year period.

The February 1985 report reviewed 13 unclassified issues and six classified ones. It discussed 17 cases of Soviet violations, probable violations, one likely and one potential violation. One issue discussed in that report related to reconfiguration of the Yankee-class submarine to carry long-range cruise missiles. This was judged not to be a violation of SALT I and is not reconsidered in the December 1985 report. The December 1985 report discusses nine cases involving violations. It opens by reaffirming that strict compliance with all provisions of arms control agreements is fundamental and that the Reagan administration will accept nothing less. To do otherwise would undermine the arms control process and damage prospects for a more constructive US-Soviet relationship. Soviet noncompliance calls into question the security benefits from arms control and undermines the confidence essential to an effective arms control process.

The administration's most recent studies support its prior conclusion that there is a pattern of Soviet noncompliance. The Soviet Union is found to have violated its legal obligation under or political commitment to seven international agreements:

- ABM Treaty (1972)
- SALT I Interim Agreement (1972)
- SALT II Agreement (1979)
- Limited Test Ban Treaty (1963)
- BW Convention (1972)
- Geneva Protocol on Chemical Weapons (1925)
- Helsinki Final Act (1975)

In addition, likely violations of the Threshold Test Ban Treaty were found.

In a fundamental sense, all deliberate Soviet violations are equally important because they cause grave concern regarding Soviet commitment to arms control. In another sense, Soviet violations are not equally important because some are of little apparent military significance in their own right. Nevertheless, such violations can acquire importance, if, left unaddressed, they become precedents for future more threatening violations. Moreover, individual violations of little military significance can become significant in their aggregate. Military significance is not necessarily the determining factor in Soviet actions in violation of their arms control commitments.

The US administration has had extensive exchanges with the USSR on its compliance concerns in the Standing Consultative Commission of SALT and through other appropriate diplomatic channels. The USSR has thus far not provided explanations sufficient to alleviate US concerns nor has it taken actions to correct existing violations. They have continued to assert that they are in complete compliance with their obligations.

The US has fully observed its arms control commitments. On 10 July 1985 President Reagan invited the USSR to establish an interim framework of mutual restraint on strategic offensive arms and deep reductions in existing nuclear arsenals. Such a framework would

require the USSR to take steps to resolve US compliance concerns. An integral part of this policy is that the US will take "appropriate and proportionate responses to Soviet noncompliance" in order to assure US national security and that of its allies.

The report includes the following specific findings:

- (1) The Krasnoyarsk large phased array radar constitutes a violation of the ABM Treaty of 1972.
- (2) While evidence of Soviet actions respecting ABM mobility are ambiguous, the USSR's development and testing of ABM system components apparently designed to be deployable at land sites requiring limited site preparation represents a potential violation of the ABM Treaty.
- (3) While evidence regarding Soviet actions respecting concurrent testing of SAM and ABM system components is ambiguous, the large number and consistency of incidents indicate that the USSR has probably violated the prohibition on testing SAM components in an ABM mode.
- (4) The evidence with regard to Soviet actions with respect to SAM upgrade is insufficient to assess compliance with the ABM Treaty.
- (5) Soviet actions with regard to rapid reload of ABM launchers constitute an ambiguous situation as concerns its obligations under the ABM Treaty. This and other ABM-related activities suggest that the USSR may be preparing in ABM defence of its national territory.
- (6) The Soviet SS-25 ICBM exceeds by more than five percent the throw-weight of the SS-13 and is not therefore a modernization of the SS-13. The SS-25 is therefore a prohibited second "new type" of ICBM and a violation of the Soviet political commitment to observe the terms of the SALT II agreement.
- (7) If the US accepted the Soviet contention that the SS-25 is not a "new type" of ICBM, the SS-25 would be a violation of their political commitment to observe the SALT II provision prohibiting the testing of an existing ICBM with a single reentry vehicle whose weight is less than 50% of the throw-weight of the ICBM.
- (8) The USSR has deployed more than 2504 Strategic Nuclear Delivery Vehicles in violation of its political commitment under SALT II.
- (9) The February 1985 Presidential report noted that evidence regarding the prohibited deployment of SS-16 missiles at Plesetsk was a probable violation of the Soviet political commitment under SALT II. Soviet activity since that time indicates probable removal of the SS-16 ICBM and the introduction of equipment associated with a different ICBM.
- (10) The temporary deployment of Backfire bombers to Arctic bases is inconsistent with the Soviet Union's political commitment under the June 1979 Backfire Statement, not to give the Backfire the capability to strike the territory of the US.
- (11) There is evidence, though ambiguous, that the Soviet Backfire production rate was constant at slightly more than 30 per year until 1984, in violation of its political commitment relating to SALT II. The production rate has decreased slightly since that time to below 30 per year.

- (12) Soviet encryption practices regarding missile tests constitute a violation of a legal obligation under SALT II prior to 1981 and a violation of their political commitment since 1982, not to impede verification.
- (13) Soviet activities related to the SS-25 are a violation of the USSR's political commitment under SALT II not to conceal the association between a missile and its launcher during testing.
- (14) The Soviet use of former SS-7 ICBM facilities in support of the deployment and operation of the SS-25 ICBM is in violation of their political commitment to continue to observe the SALT I agreement.
- (15) Ongoing Soviet activities confirm and strengthen the conclusion of earlier Presidential reports that the USSR has maintained an offensive biological warfare capability in violation of the BW Convention of 1972. While allegations concerning the use of lethal chemicals or toxins in South-East Asia or Afghanistan have subsided in 1985, there is no basis for amending the finding of former reports that the USSR was involved in the production transfer and use of trichothene mycotoxins for hostile purpose in violation of the 1925 Geneva Protocol and the 1972 BW Convention.
- (16) Despite uncertainties, a number of Soviet nuclear tests are likely violations of legal obligations under the unratified Threshold Test Ban Treaty of 1974 banning underground tests in excess of 150 kt.
- (17) Soviet underground nuclear tests have resulted in venting of radioactive matter which crossed its territorial boundary on numerous occasions in violation of the Limited Test Ban Treaty of 1963.
- (18) The Soviet Union violated its political commitment to observe the prior notification obligation of the 1975 Helsinki Final Act, with respect to its 1981 military exercise "Zapad-81". Soviet compliance with the exercise notification procedures improved in 1983 but returned to its minimalist approach regarding the provision of information in 1985.

A38(A83)

A38(A83)

Proposal Abstract A38(A83)

1. Arms Control Problem:

- (a) Chemical and biological weapons - use
- (b) Nuclear weapons - anti-ballistic missile systems
 - ballistic missiles
 - manned aircraft

2. Verification Type:

- (a) Verification - general
- (b) On-site inspection - selective

3. Source:

Towle, Philip. Arms Control and East-West Relations. London: Croom Helm, 1983.

4. Summary:

In a chapter entitled "Verification - The Experience of the 1970s" (chapter 11, pp.148-162), Towle discusses allegations of Soviet violations of the Biological Weapons Convention (see abstract 012(T72) and of the ABM Treaty (see abstract J67(T72)). He argues that were detente still in operation "the ambiguities in Soviet behaviour under international agreements would arouse very little interest" (p.158). The political context thus has an important influence on arms control. As it stands, the evidence of Soviet use of chemical weapons in Laos, Kampuchea and Afghanistan as well as the presence of biological agents in a facility near Sverdlovsk is inconclusive, but the Soviets have not taken the opportunity to defuse suspicion by opening chemical factories to inspection. However, this reluctance should not be interpreted as evidence of guilt because the Soviet concern for secrecy is well known. Soviet breaches of the ABM Treaty in the form of radars associated with SA-5 missiles being tested in an ABM mode were ended after the issue was raised by the Americans and could be explained by factors such as Soviet bureaucratic inertia, incompetence, or a deliberate test of American intelligence capabilities.

Many allegations of Soviet behaviour could be confirmed or denied only by inspection of Soviet territory or examination of casualties in Afghanistan and Southeast Asia. However, this is not likely to be permitted. As a result, "short of such inspection, arms control may continue to contribute to the decline of international confidence just as it once contributed to its enhancement" (p.161).

CHAPTER B

GENERAL ON-SITE INSPECTION*

General on-site inspection involves unrestricted access to the physical objects and related facilities which are subject to control under the terms of specific agreements. The relevant agreements could conceivably range in scope from general and complete disarmament to control of specific weapons systems. Unrestricted or general access inspection is to be contrasted with selective or progressive on-site inspection which are discussed in later chapters.

Like other verification methods, the purpose of general on-site inspection is to preclude the possibility of clandestine violations of an agreement. The degree of assurance thought to be attainable using this method varies. Some proposals consider general inspection to be capable of uncovering all possible violations, while others hold that general inspection only increases the likelihood of discovery and thereby improves the deterrent value of the verification system.

Several criticisms of general on-site inspection have appeared relating to the high cost, problems in recruiting qualified manpower and difficulties in defining the nature of the inspectorate. States have also differed in their views regarding the extent of access to be given inspectors. One country may take the view that it should be allowed to specify which of its own military sites should be open to unrestricted inspection, another the view that all participants have the right to inspect any site in any country which they suspect may contain some of the weapons or materials subject to the control agreement. These ambiguities tend to be less significant when an agreement deals with the control of all arms so that all military sites should be open. Consequently, this type of proposal has usually been applied to prospective agreements for general and complete disarmament (GCD), or for regional arms control where all significant sites in a specified region are open to inspection.

Examination of the set of proposals suggests that "unrestricted access" is seldom interpreted literally and that the considerable attention needs to be paid to framing the definition to avoid breaches of security on the one hand or evasion of commitments on the other. Proposal B13(T75) seems to be a good example of the kind of detail that may be needed for the conclusion of a successful agreement, and incidentally shows that the financial cost of this type of verification is likely to be substantial.

Peacekeeping Operations

Peacekeeping and peace observation forces perform many functions such as surveillance and reporting which can be accurately described as

* The term "inspection", as used in this chapter and the three following ones, refers to inspections conducted by adversary or neutral personnel, not to self-inspection which is dealt with in Chapter N.

verification of regional arms control undertakings. This is particularly true regarding the monitoring by such forces of demilitarized zones and disengagement agreements which involves general on-site inspection as well as other verification techniques. In addition, many aspects of the organizing and performance of peacekeeping operations may give insight into similar problems faced by on-site inspection systems in a variety of arms control contexts. Finally, past experience with peace observation (international fact-finding commissions established to investigate specific international disputes) may have considerable relevance in the verification of arms control agreements especially in relation to the implementation of some types of complaints procedures.

It must, however, be pointed out that there are several differences between peacekeeping generally and arms control verification. For example, peacekeeping operations are frequently set up on relatively short notice when military conflict is imminent or actually occurring. This is unlikely to be the case for most arms control verification operations. Furthermore, peacekeeping often includes activities beyond the monitoring role, such as mediation and the use of force in self-defence. Nevertheless, despite these differences many characteristics of peacekeeping operations are relevant both directly and by analogy to arms control verification. Consequently, several discussions of peacekeeping and peace observation forces have been included in this chapter.

B1(A61)

B1(A61)

Proposal Abstract B1(A61)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - proliferation
 - ballistic missiles
 - research and development

2. Verification Type:

- (a) On-site inspection - general
 - sampling
- (b) Remote sensors - aerial
 - satellite
- (c) Records monitoring - economic
 - plant
- (d) Non-physical/psychological inspection
- (e) Literature survey - budgetary analysis

3. Source:

Feld, Bernard T. "Inspection Techniques of Arms Control". In Arms Control, Disarmament and National Security, pp. 317-332. Edited by Donald G. Brennan. New York: George Braziller, 1961.

4. Summary:

Feld surveys techniques for inspection which include: (1) general ground surveillance; (2) inspection of known facilities; (3) aerial and outer space reconnaissance and surveillance; (4) special techniques for the detection of radioactivity; (5) budget and expenditure inspection; (6) inspection of production and inventory records; (7) utilization of the general population for information; (8) utilization of key people for the location of key activities; (9) a census of the activities of specialists; and (10) establishment of an international intelligence network.

Common problems of inspection systems are also discussed in this article. With regard to the organization and staffing of the inspectorate, Feld states that "It is necessary to provide for supplementary functions of a positive, constructive nature if the inspectorate is to attract and retain personnel of a sufficiently high calibre to enable it to perform its supervisory tasks with the requisite ability and efficiency" (p. 325). Another problem is designing sampling techniques to search for undeclared facilities and weapons or for clandestine activities which violate an agreement intentionally. Research on inspection problems will be necessary to maintain the effectiveness of the inspection system.

Two specific problems are examined: verifying stockpiles of weapons and limitations on research and development. Estimates of

past production of fissionable products becomes more uncertain with increases in the total amount of material processed and in the length of time during which there has been no inspection. One answer is to make public the presently accepted upper limit for production. Verification of stockpiles of ICBMs is complicated because of widespread production of various components, but this may also offer a large number of possible points of detection. Non-physical inspection techniques (psychological inspection, inspection by the people) may be useful for discovering weapons at the assembly stage. Verification of research and development activities is difficult, but records inspection and non-physical techniques might be applicable. Ultimately, the best answer is national self-restraint and the abandonment of secrecy.

B2(A65)

B2(A65)

Proposal Abstract B2(A65)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - general

3. Source:

Lall, Betty Goetz. "Perspectives on inspection for arms control".
Bulletin of the Atomic Scientists 21 (March 1965): 51-53.

4. Summary:

This paper represents a plea to the US and USSR to re-examine their positions and attitudes to inspection which is viewed as important for creating international confidence in arms control undertakings. In the course of a review of American and Soviet positions in the early sixties on the issue, the author presents a concise examination of the historical roots of the policies of the two governments.

Regarding the shift of US policy after World War Two from an anti- to a pro-inspection position, Lall suggests three factors:

- (1) US desire to prevent proliferation of the atomic bomb,
- (2) trauma of the surprise attack on Pearl Harbor, and
- (3) the secretive nature of the USSR.

To explain Soviet policy, Lall suggests five factors:

- (1) isolation of the Russian people from other countries and a countries and a distrust of foreigners,
- (2) desire to protect the authority of the Soviet state,
- (3) fear that inspection by foreigners would represent espionage,
- (4) fear of exposing economic weakness, and
- (5) the possibility that the USSR may not want to live up to arms control agreements.

B2.1(A67)

B2.1(A67)

Proposal Abstract B2.1(A67)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
On-site inspection - general
3. **Source:**
Lough, Thomas S. "The Military Missions in Germany". Journal of Conflict Resolution 11, no. 2 (June 1967): pp. 258-261.
4. **Summary:**
Six Military Liaison Missions (MLMs) have operated in Germany since the end of World War Two. Three are Soviet and three are Western: American, French and British. This paper describes the history, nature, and operations of the MLMs. The MLMs are interesting for three reasons:
 - (1) they have been an arms control measure, in that they have provided the Soviets and the Western Allies with some information on the nature and extent of each other's military activities in Germany during times of crisis;
 - (2) insofar as the MLMs exercise certain limited rights of travel and make observations, they serve as an example of mobile inspection teams; and
 - (3) the MLMs may also be an example or prototype of future exchanges of military liaison missions (p. 258).The agreements which established these MLMs provided that the MLMs would have complete freedom of travel without escort or supervision anywhere within the occupied zones of each party except places of disposition of military units. MLMs have their own communications stations within their headquarters and can use normal mail, telegraph and telephone facilities. Their members possess diplomatic immunity. Their stated purpose was to protect the interests of their nationals and their property in the zones in which they are located. Since 1951 the restricted areas in East Germany closed to western MLMs have grown to one third of the territory of that country.

B3(A68)

B3(A68)

Proposal Abstract B3(A68)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) On-site inspection - general
- (b) International control organization
- (c) International exchanges of information

3. **Source:**

Burns, Richard Dean and Donald Urquidi. Disarmament in Perspective: An Analysis of Selected Arms Control and Disarmament Agreements Between the World Wars, 1919-1939. Los Angeles: California State College at Los Angeles Foundation, July 1968. 4 volumes. NTIS AD 696 940.

4. **Summary:***

The authors provide a detailed examination of interwar arms control agreements including a description of their provisions and an evaluation of their success or failure. Among the elements considered are the verification and control provisions of these agreements. The authors conclude, in general, that these provisions varied enormously between agreements, ranging from those which contained complex supervisory arrangements to those entirely lacking formal verification. Two general observations are suggested. First, nations formulating arms agreements exhibited little mutual interest in or concern for international control machinery. Second, the authors' research indicates that there was "little relationship between compliance and verification; that is, a higher degree of compliance does not appear to have been directly related to the employment of more extensive supervisory instruments. Compliance seems to have depended more on whether the basic treaty provisions were imposed or negotiated, on whether the terms reflected concern for national security, and on the signatories respect for national honour" (Volume 4, p.16).

To summarize briefly some of the more specific observations made by the authors:

* **Editor's Note:** There is an extensive literature on the subject of verification and compliance during the period between the World Wars. Because of time limitations only a few such articles have been included in this Compendium. While verification technology has advanced since that era, some of the historical insights relating to these issues continue to have relevance today.

- (1) Extensive supervisory powers were given the various Inter-Allied Control Commissions set up to enforce the Versailles Treaty and the similar accords with the other vanquished Central Powers. The methods used by these bodies included inspection.
- (2) The Straits Commission as provided for in the Lausanne Treaty (1923) represented a mixed system of control involving representation from both the Western powers and Turkey, the defeated Central Power. The Commission had the power of observing but not "inspecting".
- (3) None of the various naval treaties created formal control agencies, indeed such agencies were never considered. The Washington Treaty (1922) did provide for reconvening a conference of the parties if technological development warranted it. The London Treaty (1936) provided for the annual exchange of detailed information on naval construction. It appears that the intention of the parties in the absence of formal verification arrangements in the treaties was to use their naval attachés to obtain the relevant information.
- (4) Demilitarization agreements contained several different verification and control procedures.

B3.1(A68)

B3.1(A68)

Proposal Abstract B3.1(A68)

1. **Arms Control Problem:**

- (a) Any arms control agreement
- (b) Conventional weapons

2. **Verification Type:**

- (a) On-site inspection - general
- (b) Verification, general

3. **Source:**

Phillips, James H. A Review of the Provisions and Effectiveness of Selected Arms Control Agreements, 1812-1939. Prepared for the US Department of Energy. Arlington Virginia: RDA Logicon, R & D Associates, October 1985. RDA-TR-122131-001.

4. **Summary:***

The report briefly summarizes historical research conducted regarding a number of arms control agreements with particular emphasis on the verification and compliance provisions. Among the agreements reviewed are: the Treaty of Versailles (1919), the Rush-Bagot Agreement (1817), the Washington Treaty (1921) and the London Naval Treaty (1930).

Among the author's conclusions are the following:

- (1) The passage of time and the politics of the moment can downgrade the monitoring of compliance and reduce the objectivity of data assessment.
- (2) Political leaders tend to explain away evidence of violations that, if pursued, would have awkward political implications. This is particularly true in democratic societies which must accommodate the views of arms control supporters.
- (3) Many of the agreements examined had no effective verification provisions and none had automatic sanctions to deter evasion.
- (4) The attitude of governments towards the seriousness of non-compliance indicated that many individual violations were not thought to be militarily significant.
- (5) The Inter-Allied Commission of Control of the Treaty of Versailles involved unlimited on-site inspection rights yet

* **Editor's Note:** There is an extensive literature on the subject of verification and compliance during the period between the World Wars. Because of time limitations only a few such articles have been included in this Compendium. While verification technology has advanced since that era, some of the historical insights relating to these issues continue to have relevance today.

Germany was able to frustrate, delay and deny effective inspection as well as explain away and hide non-compliance. This raises the question of the effectiveness of on-site inspection for verification purposes and the role of non-parties in providing a haven for treaty evasion.

- (6) If compliance is in the best interests of the parties, they will do so even in the absence of explicit verification provisions. However, a treaty will not restrain a nation from actions it regards to be in its national interests, no matter how stringent the verification provisions.

B4(A62)

B4(A62)

Proposal Abstract B4(A62)

1. **Arms Control Problem:**

General and complete disarmament

2. **Verification Type:**

- (a) On-site inspection - general
 - selective
 - sampling
- (b) International control organization
- (c) International exchange of information

3. **Source:**

Blackett, P.M.S. "Steps Toward Disarmament". Scientific American 206, no. 4 (April 1962): 45-53.

4. **Summary:**

In the initial stage of the disarmament process, all parties would supply one another with a list of nuclear weapons and delivery systems under their control, as well as research and production facilities concerned with these systems. The exact location of these weapons and facilities would not be specified during this stage.

Upon completion of the inventory stage, an agreed number of weapons would then be destroyed and their destruction verified through on-site inspection by an International Control Organization. When destruction of these weapons is complete, a general inspection, using sampling techniques, would begin in order to verify the correctness of the numbers remaining after the agreed reductions had been verified.

Assuming all is found to be in order, it would be possible to proceed to further reductions or complete elimination of remaining armaments.

B5(A63)

B5(A63)

Proposal Abstract B5(A63)

1. **Arms Control Problem:**
General and complete disarmament
2. **Verification Type:**
On-site inspection - general
3. **Source:**
McGuire, B. "Disarmament: A Captive Inspectorate". In Weapons Management in World Politics: Proceedings of the International Arms Control Symposium, December 17-20, pp. 149-151. Edited by J.D. Singer. Ann Arbor, Michigan: 1963.

4. **Summary:**

This proposal suggests that, in order to overcome objections that on-site inspection is little more than legalized espionage and the objections that disarmament without inspection is unacceptable, a "captive" inspectorate should be established. It would have complete access to all facilities in the host country, but its capacity to transmit information would be restricted to prevent transmissions concerning the locations and characteristics of host installations. Communication would be restricted to information regarding the progress (or lack of it) towards disarmament.

To accomplish this the inspectorate would be segregated from the host population except during inspection trips. Special cities would be established, perhaps underground, so the host country could more easily monitor power input to the city, ascertain that radio messages were not being sent from the city, and exclude from the city electronic components which would be used for high power radio transmission. Measures would also be taken to prevent the corruption of inspection teams by host agents.

Moreover, aerial and surface photography should be expressly permitted and equipment to carry this out should be provided. Transportation of the inspectorate would be handled by the host but the directions of the inspectorate in this regard should be followed, within clearly defined limits. Facilities for daily communication between inspection teams and inspectorate cities would be maintained by the host nation.

If the disarmament program were set in clearly defined stages, the inspectorates would report to their governments at the end of each stage. It would be best to have many short-term stages rather than a few broad, long-term stages. In this way, non-compliance by any given state would not handicap other states that had complied.

B6(A62)

B6(A62)

Proposal Abstract B6(A62)

1. **Arms Control Problem:**
Regional arms control
2. **Verification Type:**
On-site inspection - general
3. **Source:**
Schelling, T.C. "A Special Surveillance Force". In Preventing World War III: Some Proposals, pp.87-105. Edited by Quincy Wright, William M. Evan and Morton Deutsch. New York: Simon and Schuster, 1962.

4. **Summary:**

This paper's proposal is founded on the expectation that in certain circumstances the US and USSR may be confronted by a situation where they must rapidly agree on some disarmament measures and will need a group of observers on short notice to verify the agreement. Such a situation of "crash disarmament" could arise if the two countries found themselves on the brink of war. To meet such a situation, Schelling suggests the creation of a standing special surveillance force which would be in existence and ready to monitor compliance with any agreement. There would be two forces, each made up of the nationals of one side and located on the territory of the other. Both would be characterized by readiness, speed, reliability, self-sufficiency, versatility and ability to improvise.

It would be important that each force have quick and reliable communications with their own governments and that they be prepared to move sizable distances rapidly. They would initially be located at dispersed strategic points to allow quick travel times to places they might be needed. Freedom of movement would also be essential.

Each force would also need extensive practice in operating their equipment, coordinating with their hosts and in overcoming obstacles in order to be ready to undertake their verification duties in a crisis.

B7(T59)

B7(T59)

Proposal Abstract B7(T59)

1. Arms Control Problem:

Regional arms control - demilitarization
- Antarctica

2. Verification Type:

- (a) On-site inspection - general (Article 7)
 - obligatory
- (b) Remote sensors - aerial (Article 7(4))
- (c) International exchange of information (Article 7(5))
- (d) Complaints procedure - consultation and cooperation (Article 11(1))
 - referral to International Court of Justice (Article 11(2))
- (e) Review conference - (Article 9(1))

3. Source:

The Antarctic Treaty.

Concluded: 1 December, 1959.

Entered into force: 23 June 1961.

Number of parties as of 31 December, 1986: 32.

4. Summary:

The Antarctic Treaty internationalizes and demilitarizes the Antarctic continent as well as provides for its cooperative exploration and use "for peaceful purposes only". It specifically prohibits "any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres, as well as the testing of any type of weapons" (Article 1(1)).

The Treaty's system of control is based on the use of inspectors (Article 7). Inspectors are nationals of the states parties which designate them and they remain under the exclusive control of their national government no matter where they are in Antarctica (Article 8), in order to prevent disputes over jurisdictional claims. These observers have full access to all installations, ships and aircraft at all times. Aerial surveillance is also permitted. In addition, each party is required to inform the others of all expeditions it launches to Antarctica, stations it occupies there and military personnel or equipment which it introduces to the continent (Article 7(5)). This information can be verified by inspection. Finally, Article 9 provides for an on-going consultation system.

Text of Major Verification Related Provisions:

Article 7

1. In order to promote the objectives and ensure the observance of the provisions of the present Treaty, each Contracting Party whose representatives are entitled to participate in the meetings referred to in Article IX of the Treaty shall have the right to designate observers to carry out any inspection provided for by the present Article. Observers shall be nationals of the Contracting Parties which designate them. The names of observers shall be communicated to every other Contracting Party having the right to designate observers, and like notice shall be given of the termination of their appointment.

2. Each observer designated in accordance with the provisions of paragraph 1 of this article shall have complete freedom of access at any time to any or all areas of Antarctica.

3. All areas of Antarctica, including all stations, installations and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all times to inspection by any observers designated in accordance with paragraph 1 of this Article.

4. Aerial observation may be carried out at any time over any or all areas of Antarctica by any of the Contracting Parties having the right to designate observers.

5. Each Contracting Party shall, at the time when the present Treaty enters into force for it, inform the other Contracting Parties, and thereafter shall give them notice in advance, of

(a) all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory;

(b) all stations in Antarctica occupied by its nationals; and

(c) any military personnel or equipment intended to be introduced by it into Antarctica subject to the conditions prescribed in paragraph 2 of Article 1 of the present Treaty.

Article 9

1. Representatives of the Contracting Parties named in the preamble to the present Treaty shall meet at the City of Canberra within two months after the date of entry into force of the Treaty, and thereafter at suitable intervals and places, for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering and recommending to their Governments, measures in furtherance of the principles and objectives of the Treaty, including measures regarding, inter alia, facilitation of the exercise of the rights of inspection provided for in Article VII of the Treaty.

B8(A66)

B8(A66)

Proposal Abstract B8(A66)

1. Arms Control Problem:

Regional arms control - demilitarization

2. Verification Type:

On-site inspection - general

3. Source:

Wainhouse, David W. International Peace Observation: A History and Forecast. Baltimore: Johns Hopkins Press, 1966.

See also: International Peacekeeping at the Crossroads: National Support - Experience and Prospects. Baltimore; John Hopkins Press, 1973.

4. Summary:

International Peace Observation is an extensive and detailed work which examines more than seventy cases since World War I where "international peace observation" has been employed. Peace observation is defined as a method whereby the organized international community initiates a third party intervention as early as possible in a threatening situation with a view to permitting calmer judgements to allay the potential or actual conflict.

The book covers cases involving the League of Nations, several Inter-American organizations, the UN and other multilateral arrangements. Each case study includes a brief description of the history of the dispute, the peace observation arrangements that were created to deal with it and an evaluation of these arrangements. In the final section of the book the author lays out his general conclusions together with suggestions regarding future peace observation activities. Included here is a detailed proposal for the organization and equipping of a permanent UN peace observation corps, a body which conceivably could find use in an arms control verification situation. Of interest in the final section of the book are also chapters dealing with:

- Authority and Terms of Reference,
- Peace Observation and Cooperation of the Parties,
- Chief Tasks of Peace Observation,
- Organization and Support of Peace Observation Missions, and
- Termination of Peace Observation.

International Peacekeeping at the Crossroads covers several cases since World War II. Details about organization, personnel and logistics are given for each case. The conclusions and recommendations, however, are mainly intended for US policy makers.

B9(G69)

B9(G69)

Proposal Abstract B9(G69)

1. Arms Control Problem:

Regional arms control - demilitarization
- sea bed

2. Verification Type:

On-site inspection - general

3. Source:

Union of Soviet Socialist Republics. "Draft treaty on prohibition of the use for military purposes of the sea bed and the ocean floor and the subsoil thereof". ENDC/240, 18 March 1969.

See also: - ENDC/PV. 400, 3 April 1969.

4. Summary:

The object of the draft treaty was to ban the use of the sea and ocean floor beyond a 12 mile coastal zone, for any military purpose. (Article 1).

In order to verify compliance, all installations and structures on the sea bed were to be open to representatives of other states parties to the treaty "on the basis of reciprocity". (Article 2).

In submitting this proposal, the Soviet Union contended that verification of a ban on all military activity on the sea bed would be simplified because a partial ban would require greater detail as to the verification procedures. A total ban would reduce the number of objects to be controlled since only peaceful objects would remain. As well, the Soviet Union contended that total demilitarization would reduce fears that the verification of objects on the sea bed would disclose military secrets.

B10(A71)

B10(A71)

Proposal Abstract B10(A71)

1. **Arms Control Problem:**
Regional arms control - demilitarization
2. **Verification Type:**
On-site inspection - general
3. **Source:**
Boyd, James M. United Nations Peace-keeping Operations: A Military and Political Appraisal. New York: Praeger, 1971.
4. **Summary:**
This book focusses on three UN peacekeeping operations: UNEF (1956), ONUC (1960) and UNICYP (1964). Of main interest in the context of arms control verification is the book's discussion of the problems - legal, political and administrative - surrounding the creation, composition and operation of these peacekeeping forces. Several recommendations by the author are included. Particularly relevant chapters are:
 7. Force Composition and Organization,
 8. Command and Control, and
 10. Military Readiness.

B11(T73)

B11(T73)

Proposal Abstract B11(T73)

1. Arms Control Problem:

Regional arms control - demilitarization
- Indochina

2. Verification Type:

On-site inspection - general

3. Source:

Agreement on Ending the War and Restoring Peace in Vietnam and
Protocols (Vietnam Peace Accords).

Signed: 27 January 1973. (For text see Facts on File, January 21-27,
1973).

4. Summary:

Responsibility for verification of the provisions of the Agreement was given, in part, to an International Commission of Control and Supervision (ICCS) which was established immediately upon signature of the Accords. Article 18 of the Agreement and the Protocol concerning the International Commission of Control and Supervision outlined the functions, powers and structure of the ICCS. Its functions included the controlling and supervising the implementation of:

- (1) the cease-fire in South Vietnam,
- (2) the withdrawal of all foreign troops from South Vietnam,
- (3) the dismantling of all foreign military bases in South Vietnam,
- (4) the exchange of prisoners of war,
- (5) the ban on introduction of troops into South Vietnam,
- (6) the general elections in South Vietnam, and
- (7) the reduction of troop levels of the two South Vietnamese parties.

The ICCS was composed of representatives of four countries (Canada, Hungary, Indonesia and Poland) with the chairmanship of the Commission rotating among members. Operations of the ICCS were to be carried out in accordance with the "principle of consultation and unanimity". Until an international conference had been set up pursuant to the Agreement, the ICCS was to report to the parties. The Commission was intended to continue operations until the new government of South Vietnam formed after the general elections provided for in the Accords requested its termination.

The Protocol specified that the ICCS was to perform its functions "through communication with the parties and on-the-spot observation". It was to be allowed "such movement for observation as is reasonably required for the proper exercise of its functions" and its members were to be accorded diplomatic privileges and immunities. The Commission was also empowered to investigate violations at the request

of any party or when the Commission had "adequate grounds" for considering there to have been a violation. If the Commission found that a violation had occurred it was to report this to the parties.

Numbers and location of the headquarters staff and the regional and other teams of the ICCS were spelled out in detail in the Protocol. The formula for financing the Commission was also stated.

Parties were obligated to cooperate and assist the ICCS in the execution of its duties. Regular and continuous liaison between the parties and the Commission was to be maintained. The Joint Military Commissions of the parties which were set up by the Agreement were also to cooperate closely with the ICCS.

In addition to the ICCS, a Four Party Joint Military Commission and a Two Party Joint Military Commission were created. The Joint Commissions were dealt with in Articles 16 and 17 of the Agreement and in a Protocol. These bodies were responsible for ensuring joint action by the parties in implementing the provisions of the Agreement. Among the duties of the Four Party Commission was "drawing up plans and fixing the modalities to carry out, coordinate, follow and inspect the implementation" of many of the same provisions to be monitored by the ICCS. It was also "to deter and detect violations". There was thus considerable overlap between the responsibilities of this body and the ICCS.

Personnel and location of the headquarters and the teams of the Four Party Commission were dealt with in detail in the Protocol as were the privileges and immunities of its personnel, its financing, and the responsibilities of the parties for providing assistance. This Commission was also to operate on the basis of unanimity. Disagreements were to be referred to the ICCS.

B12(A74)

B12(A74)

Proposal Abstract B12(A74)

1. **Arms Control Problem:**
Regional arms control - demilitarization
2. **Verification Type:**
On-site inspection - general
3. **Source:**
Rikhye, Indar Jit, et al. The Thin Blue Line: International Peacekeeping and Its Future. New Haven, Conn.: Yale University Press, 1974.
4. **Summary:**
This work provides a description and some evaluation of several peacekeeping and observer missions. Case studies include chapters on UNEF II, UN Observer and Supervisory Missions, and Indochina observer activities.

B13(T75)

B13(T75)

Proposal Abstract B13(T75)

1. Arms Control Problem:

- (a) Regional arms control - demilitarization
 - Middle East
- (b) Conventional weapons - ground forces

2. Verification Type:

- (a) On-site inspection - general
 - control posts
 - obligatory
- (b) Short-range sensors - monitoring devices
- (c) Remote sensors - aerial
- (d) Complaints procedure - consultative commission

3. Source:

Agreement Between Egypt and Israel, and Annex (Sinai Disengagement Agreement).

Signed: September 1, 1975.

Early Warning System Proposal by the United States of America. September 1, 1975. (For texts see Facts on File, 6 September 1975, p. 643-4).

See also: - Kolcum, E.H. "New Sensors Evaluated in Sinai Buffer". Aviation Week and Space Technology (23 August 1976): 40-42.

- United States Sinai Support Mission. Report to the Congress. Washington, D.C.: 13 April 1978.
- United States Sinai Support Mission. Watch on the Sinai. Washington, D.C.: June 1980. Dept. of State Publication 9131, General Foreign Policy Series 321.
- United States Sinai Support Mission. Peace in the Sinai. Washington D.C.: Department of State, 1982(?).
- United States. Congress. Senate. Committee on Foreign Relations Sinai Agreement. 97th Congress, 1st session, July 20, 1981. Washington D.C.: US Government Printing Office, 1982.
- Abstract B16(T79)

4. Summary:

The agreement provided for disengaging Egyptian and Israeli forces in the Sinai. It established two zones in which forces of each side must be limited. These two zones were placed on either side of a buffer zone where no military personnel of the two sides were to be stationed (save for the exception discussed below). The United Nations Emergency Force (UNEF) was to occupy this buffer zone. Another zone under UNEF control was established in the South.

The Annex of the agreement defined some of the verification provisions. (This Annex was a statement of agreed principles to serve as a basis for a Protocol which was subsequently negotiated). As agreed the UNEF had complete control of the buffer zone. In the

Southern demilitarized zone UNEF had freedom of movement and checkpoints so as to ensure that no military forces were present. Both these functions might be described as a form of general on-site inspection on the part of UNEF.

In the two restricted military force zones UNEF conducted on-site inspections to ensure maintenance of the agreed force limitations. This again is a type of general on-site inspection.

An additional verification method employed was aerial surveillance. Overflights were originally conducted by the US once every 7-10 days or on request. Results of these reconnaissance flights were provided to both parties and to UNEF. Subsequently, it was agreed that Egypt and Israel could make seven reconnaissance flights over the area each week provided no more than two aircraft were used at a time and flights were not less than an altitude of 15,000 ft. They were to fly along the buffer zone centerline and make no abrupt turns while over the zone.

Finally, the US proposed and it was eventually agreed that two "surveillance" stations and three "watch" stations be established as part of an early warning system. The two "surveillance" stations, one Egyptian and one Israeli were established in the buffer zone near the strategic Giddi pass. They performed the functions of visual and electronic surveillance. Each station was limited to 250 personnel armed only with light defensive weapons.

The three "watch" stations were established by the US on the Mitla and Giddi passes. American civilian personnel of the Sinai Field Mission (SFM) operated these installations which also included three unmanned electronic sensor fields. The stations reported any unauthorized activity by either Egypt or Israel in the two "surveillance" stations and any unauthorized movement of troops into the passes or preparation for such movement.

A complaints procedure was established under Article 6 of the agreement. It was in the form of a joint commission of the parties under the aegis of the Chief Coordinator of the UNEF.

The following sensor systems, some of which were used to monitor the de-militarized zone between North and South Vietnam, were employed to monitor the Sinai Disengagement Agreement.* These included:

an electronic fence and a passive infra-red confirming scanner. The electronic fence is called SSCS for strain sensitive cable sensor. It is basically a coaxial cable implanted in the sand along both sides of the roadway. When anything passes through, it transmits a signal ...

* This discussion is taken from: E.H., Kolcum, "New Sensors Evaluated in Sinai Buffer". Aviation Week & Space Technology (23 August 1976): 40-42.

The scanner is called Pires. It displays an infra-red picture that tells a trained operator what type of incursion is taking place whether it is a large force, a single person, tank or jeep. The operator also can determine direction and speed.

Much of the equipment used in Vietnam now in place here has undergone refinement and modification. It includes: Minisid 3, a seismic intrusion detector that senses earth vibrations. Battery-operated, it is implanted under 6 in. of sand at random distances along entrances to the passes. It can detect a vehicle 1,650 ft. away, and a person 150 ft. distant. Circuitry in Minisid 3 will self-destruct unless a combination code is used to open it. Batteries last about a year.

AAU, which means acoustic add-on unit ... is activated when Minisid senses earth vibrations and it transmits sounds from the intrusion to the watch station.

DIRID, for directional infra-red intrusion detector ... is a passive optical device with two fields of view along the pass entrances. It is used to complement Minisid 3's sensors. When an intrusion occurs, the returned signal tells the operator what sensor was excited and Dirid can be aimed at that point.

TVS-4, basically a pair of binoculars with a large aperture ... enables visible verification of eruptions from electronic sensors.

When a sensor is excited, it returns a signal to the watch station where a time history of the movement is recorded on metalized chart paper. As soon as an intrusion is verified, a VHF radio message, backed by teletypewriter, is sent to a State Department liaison officer at base camp. He immediately communicates that there is an intrusion, and the Sinai Field Mission analysis of it, to the United Nations in Ismailia, Egypt, the Egyptian Ministry of War in Cairo, Israeli Defence Force in Tel Aviv and to the single Israeli and Egyptian surveillance sites just inside the buffer zone ... The base camp also has a secure communications link - an HF single sideband radio teletypewriter that ties into the US government communications network. An alternate means and procedure for detection is being developed by the United States Sinai Support Mission (SSM), according to a recent report.* The system currently used has been described in the previous paragraph. Under the alternate system: ... signals from the unmanned sensor fields are relayed directly to the operations center at the Sinai Field Mission Headquarters and all sensor activations are instantly displayed on a scaled map of the early warning area. As sensor activations light up small bulbs on the map, the Operations Officer can instantly see the location of an intrusion, and by observing the number of sensors in a line of sensors perpendicular to the road that are activated, he can determine the nature of the object

* United States Sinai Support Mission. Report to the Congress 13 April 1978, pp.10-14.

involved. The heavier the object the more sensors are activated and the more lights flash. An intruder can then be tracked through the early warning area by observing the sequence of lights on the map ... This system should improve the timeliness, accuracy and completeness of the early warning system detection process. (pp. 10-11)

In addition, two other developments are of interest. First, the SSM added a new remotely-controlled day and night camera system to the sensors already deployed. This system detected an object before it entered the existing sensor fields and therefore reduced the time necessary to identify an intruder.

The second development arose from the fact that the ability of monitoring personnel to identify activity in the sensor fields deteriorated appreciably under conditions of poor visibility especially dust and ground fog. In an attempt to overcome this problem, the SSM borrowed two thermal imaging devices from the US Army. These devices, which were similar to the forward-looking infra-red system (FLIR), could detect the infra-red energy emitted by objects. It was expected that dust and fog would cause less interference for these devices than for visible light sensors.

The United States Sinai Support Mission (SSM)* was established by Executive Order on 13 January 1976 pursuant to Public Law 94-110 of 13 October 1975. It functioned until September 1982. The operating arm of the SSM, the Sinai Field Mission (SFM) was set-up and run by civilian contractors. It became fully operational on 22 February 1976. Its basic duties were to report any movements into the Giddi and Mitla Passes or any preparation for such movement as well as verify the nature of operations of the Egyptian and Israeli electronic surveillance stations in the buffer zone using unattended electronic sensor fields and manned watch stations described above. At the height of its activities the SFM employed 175 American civilians. Between 1976 and 25 January 1980, the SFM monitored about 240 square miles of territory. It reported 90 violations, most of them minor and quickly corrected. The early warning stations were deactivated in February 1980. With the lapsing of the United Nations Emergency Force mandate in the summer of 1979, the SFM was operating the new verification system for the Egypt-Israel Peace Treaty (see Abstract B16(T79)). Its new duties included on-site inspections to verify force levels at Egyptian installations in Zones A and B at Israeli technical stations located in the interim Buffer Zone. The inspections were conducted by four man teams, each comprising a US civilian contract employee from the SFM trained to identify military organization and equipment plus a liaison officer from each of the

* More detail concerning the setting-up and operations of the SSM and SFM can be found in : United States Sinai Support Mission, Watch on the Sinai, Washington D.C.: June 1980. Department of State Publication 9131, General Foreign Policy Series 321.

Egyptian, Israeli and American governments. This new role expanded the SFM's area of responsibility to cover 15,600 square miles. From its inception to its phase-out in September 1982, SSM and SFM operations cost about \$103 million.

The SSM, itself, has recognized the potential application of the experience gained by its operations in the Sinai to other areas of conflict. In its publication Watch on the Sinai it states:

Drawing upon its 4 years' experience in the Sinai, the SSM believes that the basic operational concepts employed there can be applied to many other border or buffer areas, provided the parties directly concerned want and are willing to support them. An early warning/alert system can be designed to monitor a border or disengagement line, possible invasion routes, or even a predetermined sizable area, using a combination of unattended ground sensors, advanced observation devices, and observer personnel. Such a surveillance system could detect hostile movement of ground forces or clandestine infiltration and provide sufficient alert to allow an interdiction force to react.

The traditional approach to the problem of monitoring a border or a restricted area usually involves wide-scale use of a combination of fixed observation posts and roving patrols. To be effective, this approach needs a comparatively large number of people. Now, however, by using modern surveillance technology, one person located at a central monitoring facility can "watch" a border or area that would normally require a substantial force to patrol. When an apparent intrusion is detected, a small reaction team can be dispatched to investigate the incident. Where large areas or long borders are concerned, the surveillance and interdiction force of a peacekeeping operation using advanced surveillance technology may be reduced by 50 to 75 percent below that needed to accomplish the task by traditional means.

It is not difficult to envisage how these general operational surveillance concepts could be applied to cease-fire and armistice lines in other regions, including other areas of the Arab-Israeli conflict. For example, a network of ground sensors, watch stations, remotely controlled imaging equipment, and river or border crossing checkpoints monitoring a demilitarized zone along the Jordan River Valley could effectively detect and provide adequate alert of any attempted clandestine movement by terrorist bands or unauthorized individuals. Such a system, supplemented by strategic surveillance sites and long-range detection mechanisms, could also provide warning of any ground movement exhibiting potentially hostile intent beyond the demilitarized zone. (p. 34)

B14(A78)

B14(A78)

Proposal Abstract B14(A78)

1. **Arms Control Problem:**
Regional arms control - demilitarization
2. **Verification Type:**
On-site inspection - general
 - control posts
3. **Source:**
International Peace Academy. Peacekeeper's Handbook. New York:
International Peace Academy, 1978.
See also: - Abstract B20(A84)
4. **Summary:**
The Handbook is intended to serve both as a teaching aid and as an operational notebook for members of UN peacekeeping operations. It covers several areas of potential interest in regard to the establishment of on-site inspection schemes for arms control verification. There is coverage of such general practical questions as administrative organization, logistics support, communications systems, and operational procedures for relatively large groups of observers. There are also sections which deal with observation techniques (including how to set up observation posts), surveillance reporting (including supervision of armament control agreements, establishment of buffer areas for demilitarized zones, surveillance of military deployment limitations, and supervision of military withdrawals or disengagement), patrolling and reporting, and information gathering. Also included in the Handbook are practical examples of floorplans for observation posts, organization charts and report forms.

B15(A78)

B15(A78)

Proposal Abstract B15(A78)

1. Arms Control Problem:

Regional arms control - demilitarization
- Middle East

2. Verification Type:

- (a) On-site inspection - general
- (b) Short-range sensors - monitoring devices
- (c) Remote sensors - aerial
- (d) Complaints procedure - consultative commission

3. Source:

Shalev, Aryeh, Brig Gen. (Res.). Security Arrangements in Sinai Within the Framework of a Peace Treaty with Egypt. Tel Aviv: Center for Strategic Studies, Tel Aviv University, October 1978. CSS Papers, no. 3.

4. Summary:

This paper outlines proposals for the security arrangements in the Sinai to be included in an Egypt/Israel peace agreement. One of the aspects discussed is supervision and early warning. In general these include:

- (1) an international force in specific zones in the Sinai,
- (2) early warning stations on both sides of a demilitarized area,
- (3) mechanisms of control over the demilitarized areas and areas of limited forces by UN observers,
- (4) apparatus for clarifications and coordination between Egypt and Israel, and
- (5) mechanisms for obtaining aerial photographs of the area.

The paper reviews several approaches to these questions outlining their disadvantages and advantages.

B16(T79)

B16(T79)

Proposal Abstract B16(T79)

1. Arms Control Problem:

- (a) Regional arms control - demilitarization
 - Middle East
- (b) Conventional weapons - aircraft
 - ground forces
 - ships

2. Verification Type:

- (a) On-site inspection - general
 - selective
 - control posts
 - obligatory
- (b) Short-range sensors - monitoring devices
- (c) Remote sensors - aerial
- (d) Complaints procedure - consultative commission

3. Source:

Treaty of Peace between the Arab Republic of Egypt and the State of Israel and Annexes.

Signed: 26 March 1979. (For text see Facts on File, 30 March 1979, pp. 223-227).

Protocol to the Egyptian-Israeli Treaty of Peace.

Signed: 3 August 1981. (For text see Sinai Agreement cited below).

See also: - Framework for Peace in the Middle East at Camp David. 17 September 1978.

- United States. Congress. Senate Committee on Foreign Relations. Sinai Agreement. 97th Congress, 1st session, July 20, 1981. Washington D.C.: US Government Printing Office, 1982.
- United States Sinai Support Mission. Peace in the Sinai. Washington D.C.: Department of State, 1982(?).
- United States Sinai Support Mission. Watch on the Sinai. Washington, D.C.: June 1980. Dept. of State Publication 9131, General Foreign Policy Series 321.
- Houghton, Robert B and Frank G. Trink. Multinational Peacekeeping in the Middle East. Washington D.C.: Department of State, November 1984.
- Pelcovits, Nathan A. Peacekeeping on Arab-Israeli Fronts. Boulder, Colorado: Westview Press, 1984.
- Abstract B13(T75).

4. Summary:

The Treaty provides for the normalization of relations between Egypt and Israel and withdrawal of Israeli forces from the Sinai. It also specifies limited force zones in the Sinai area after completion of the withdrawal.

The Withdrawal:

UN forces will be used to supervise the withdrawal. As soon as Israeli forces withdraw, UN forces will enter the evacuated areas to establish temporary buffer zones which entail setting up checkpoints, reconnaissance patrols and observation posts. They will also perform verification functions in the limited force zones created as the withdrawal progresses (Articles 1, 2 and 5 of the Appendix to Annex 1). These function are tantamount to general on-site inspection.

A Joint Commission of the parties will be established for the duration of the withdrawal. It will supervise the implementation of the withdrawal including the resolution of any problems which arise and the provision of assistance to UN forces. The Commission will meet at least once a month or at the request of either party or the UN force commander (Article 1 (4) of Annex 1 and Article 4 of the Appendix to Annex 1).

In accordance with arrangements agreed upon by the parties and coordinated by the Joint Commission "military technical installations" will be operated at four locations in the buffer zone during the withdrawal. A third party agreed upon by Egypt and Israel will enter and conduct inspections of these installations in a random manner at least once a month. These inspections will verify the nature of the operation of the installations and compliance with agreed weapons and personnel limitation therein. The third party will immediately report to the parties any divergence from an installation's visual and electronic surveillance or communications role (Article 5 of Appendix to Annex 1). This activity by the third party can be described as a form of selective on-site inspection.

In addition to these 'technical installations' of the two parties, the US is requested to continue the operation of its Sinai Field Mission (SFM) early warning station until the completion of the withdrawal, at which time it will be terminated (Article 7 of Appendix to Annex 1).

The US is also requested to continue its airborne surveillance flights in accordance with previous agreements until the completion of the Israeli withdrawal (Article 7 of Appendix to Annex 1).

Finally, during the withdrawal, Egyptian technical teams will be permitted to observe and familiarize themselves with the operation of facilities to be transferred by Israel to Egypt for a period of up to two weeks prior to transfer (Article 6 of Appendix to Annex 1).

Post-Withdrawal Security Arrangements:

Once the Israeli withdrawal has been completed, the Treaty designates four permanent limited force zones* in the Sinai and in Israel. As when monitoring the withdrawal, UN forces and observers are to supervise the implementation of these zones and employ their best efforts to prevent any violations. UN forces will operate checkpoints, reconnaissance patrols and observation posts in one of

* The limitations extend to naval and air operations in the Sinai area.

these zones along the international border. They will conduct periodic verification of the implementation of the final zones at least twice a month or within 48 hours after a request by the parties. The UN forces will also insure freedom of navigation through the Strait of Tiran.

UN verification teams are to be accompanied by liaison officers of the two parties. Personnel of the UN forces will enjoy freedom of movement and other facilities necessary for the performance of their tasks and the UN will be able to make command arrangements which will best assure the exercise of its responsibilities. Egypt and Israel must agree on nations from which the UN forces are drawn and these must exclude permanent members of the Security Council (Article 2 & 6, Annex 1). By Article 4 of the Treaty, UN forces will not be withdrawn without the approval of all the permanent members of the Security Council unless the parties otherwise agree.

Early warning stations of the parties can be established but only in two zones: in zone 'A' (near the Red Sea and Suez Canal) in the case of Egypt and in zone 'D' (along the Israeli border) in the case of Israel. Flights of reconnaissance aircraft by the parties are also limited to these same zones (Articles 5 and 3, Annex 1).

When the Joint Commission which monitors the Israeli withdrawal is terminated upon completion of the withdrawal, a liaison system between the parties will be established to provide an effective method of assessing progress in the implementation of the final zones and to resolve any problem that may arise. Unresolved matters may be referred to higher military authorities of the parties. Direct telephone links will be maintained between the liaison offices of the two parties and between them and the UN Command (Article 7, Annex).

Note:

The original Treaty envisaged involvement of a UN peacekeeping force in monitoring of the Agreement. However, the UN Security Council indicated on 18 May 1981 that it was unable to reach the necessary agreement to establish such a force. By a Protocol to the Treaty of 3 August 1981 a Multinational Force and Observers (MFO) was established to replace the UN force. During the period 23 July 1979 to 25 April 1982, the American Sinai Field Mission (see abstract B13(T75)) conducted on-site inspections to verify compliance with the agreement in lieu of the UN force. Only 137 personnel were assigned to the SFM during 1981. From April 1980 to April 1982, 29 violations were cited by the inspection teams, 27 attributed to Egypt and 2 to Israel. None, however, undermined the Treaty.

The MFO is much larger than the SFM, involving about 2500 persons. Start up and operating costs for the MFO's first year of operations were about \$209 million with its operating costs estimated to run about \$100 million per year thereafter.

The functions of the MFO are summarized* as:

* Annex to Protocol to the Egyptian-Israeli Peace Treaty.

- (1) Operation of checkpoints, reconnaissance patrols and observation posts along the international boundary and Line B and within Zone C;
- (2) Periodic verification (at least twice a month) of the implementation of Annex 1 of the Peace Treaty;
- (3) Additional verification within 48 hours after the receipt of a request from either Party; and
- (4) Ensuring the freedom of navigation through the Strait of Tiran in accordance with Article V of th Peace Treaty.

B17(A83)

B17(A83)

Proposal Abstract B17(A83)

1. Arms Control Problem:

Regional arms control - demilitarization
- Middle East

2. Verification Type:

(a) On-site inspection - general
(b) Short-range sensors - monitoring devices
- seismic sensors

3. Source:

Wallen, James M. "The Application of Technology to Peacekeeping". In Peacekeeping and Technology: Concepts for the Future. Report of the International Peace Academy Task Force on Technology Workshop held at Ditchley Park, Oxford, England, 30 June - 2 July 1983. IPA Report No.17. New York: International Peace Academy, 1983.

4. Summary:

Wallen discusses the benefits in terms of reduction of manpower requirements and lower costs which are derived from the application of surveillance technology to peacekeeping. For example, an unaided group of observers would have to be stationed at 100 to 200 metre intervals along a border to ensure a high probability of detecting a small unit of dismounted troops entering a prohibited area at night. Unaided observation capabilities extend to 1000 metres under favourable conditions, but drop to 100 metres or less in adverse topographic and weather conditions and at night. However, night vision devices can extend observation capabilities to match those under daylight and ground sensors can detect activities which are distant from the observer. Present technology can provide a manpower multiplier of at least 5 to 1. The experiences of the Sinai Field Mission illustrate the political flexibility and cost benefits obtained from the use of technology.

Under the 1975 Egyptian-Israeli disengagement agreement on Sinai, the United States established a tactical early warning system covering the Giddi and Mitla Passes. Four sensor fields and three watch stations were set up to monitor authorized traffic and detect unauthorized traffic and activities. With only three watch stations, one sensor field was not under observation. This required sending a patrol to investigate each detected activity to determine whether it was authorized or not. The patrol had to travel 30 kilometres from the nearest watch station to the area so the verification response time was slow. Establishing another watch station would have necessitated renegotiation of the already delicate 1975 agreement and would have required more personnel. Instead, a remotely controlled

and monitored low light level television was installed. This reduced the verification time from 15-20 minutes to seconds and required no additional personnel. Over a two year period of operation, over \$150,000 in operating costs were saved.

Various types of commercially available sensor technology can aid peacekeeping. They can be classified in two categories: (1) unattended sensors which can be monitored from a watch station several cause kilometres away and (2) attended sensors which can be used at a watch station to enhance observation and detection capabilities.

Remote Unattended Ground Sensors:

These sensors are electronic, electro-optical or electro-mechanical devices which can transmit information on vibration, sound, light, heat and pressure to an observer who interprets the results. Seismic sensors have a limited range. In deep, sandy soil they can detect a man at ranges from 50 to 100 metres, light vehicles at ranges of 100 to 200 metres and medium weight vehicles at ranges of 500 to 1000 metres. In shallow soils or where there is exposed rock, the detection range is much less. Magnetic sensors, which detect disturbances in the magnetic field caused by magnetic material, can detect a rifle at a range of 4 metres and a small vehicle at a range of 20 metres. Some infra-red sensors, the directional infra-red intrusion director (DIRID) for example, can distinguish whether an object passes from left to right or right to left. They have a low incidence of false alarms and a detection range of 10 metres for personnel and 50 metres for vehicles. Pressure-strain sensors are able to detect, analyze and determine the source when an object moves along the surface of the earth. A wheelbase classifier can permit determination of whether the source of strain is personnel, wheeled vehicles or tracked vehicles. Acoustic sensors are used in coordination with seismic sensors. They are automatically triggered by seismic activity representing personnel or vehicles. The acoustic sensors then use specialized radio transmitters to remotely monitor the sounds from an area of seismic activity and transmissions cease automatically unless seismic activity continues.

The Remote Imaging Surveillance Sensor (RISS) is a system with a low light television camera which can be monitored and controlled from a remote station up to 30 kilometres away. The system was designed specifically for peacekeeping operations as a substitute for a watch station. Command signals are carried to the camera and the picture is returned to the monitor site by microwave links. Cameras can be preset to monitor the areas in which activity may be detected by magnetic, seismic or pressure-strain sensors. The RISS television camera can function effectively in sunlight and at light levels down to normal starlight. Infra-red search lights permit monitoring if the ambient light level is even less than normal starlight.

Attended Sensors:

These sensors consist of night observation devices and short-range radars. Night observation devices use either an image intensification principle or an infra-red imaging principle. The first generation of image intensification devices are susceptible to

momentary picture loss and damage from bright objects, but this does not create significant problems for peacekeeping so the more expensive second generation devices are unnecessary. Infra-red imaging devices detect long wavelength infra-red energy which propagates better through dust, fog and smoke than the shorter wavelength energy which is sensed by the image intensifiers. However, these sensors cost more than image intensification devices, require more power and are less reliable, therefore their use in peacekeeping may not be advantageous. Short-range ground surveillance radars are portable devices which have the advantage of being able to scan large areas quickly, detect moving objects and penetrate dust, smoke, fog and even sparse foliage. Once radar detects an object, night observation devices can identify it. Radar requires operators with a much higher level of skill than that needed to operate night observation devices.

An on-site survey determined the technological requirements for surveillance by the Sinai Field Mission. Seismic sensors were used in flat areas with deep sandy soils. Infra-red sensors were installed in areas with exposed rock. Infra-red and strain-sensitive cable sensors were used at the beginning and end of sensor fields so that entry into and exit from the field by a moving object could be determined. Radio-type signals transmitted from the sensors were received and decoded at the nearest watch station. One of the two watch station operators would then use binoculars (in daylight) or a night vision device to identify the source of activity. Another technological innovation was an automated map display of the early warning area on which lights indicated individual sensor activity. A radio and teletype network enabled the Sinai Field Mission to inform the Egyptians, Israelis and United Nations personnel within five minutes of unauthorized entry into the early warning zone.

Proposal Abstract B18(A83)

1. Arms Control Problem:

Regional arms control - demilitarization

2. Verification Type:

- (a) On-site inspection - general
- (b) Short-range sensors - monitoring devices
 - seismic sensors
- (c) Remote sensors - aerial
 - radar

3. Source:

Hanning, Hugh (ed.). Peacekeeping and Technology: Concepts for the Future. Report of the International Peace Academy Task Force on Technology Workshop held at Ditchley Park, Oxford, England 30 June - 2 July 1983. IPA Report No.17. New York: International Peace Academy, 1983.

4. Summary:

This report presents the conclusions of the International Peace Academy Technology Workshop and includes the papers presented at it. In paper 1, "Peacekeeping and Technology - a statement of the requirement" (pp. 1-3), Indar Rikhye states that "IPA believes that a small expenditure on modern technology would often achieve significant reductions in [peacekeeping] force levels and enhance the competence of the force" (p.2). F.T. Liu draws a similar conclusion (p.26), but notes that the success of a peacekeeping operation depends mainly on the cooperation of the parties concerned and the support of the Security Council. Success is possible even without sophisticated devices. Furthermore, states may object to the use of monitoring devices because of concern for the secrecy of their security systems.

A paper by Alan James, "The politics of peacekeeping in the 1980s" (pp.27-41) discusses various examples of peacekeeping and verification of demilitarization by both UN and non-UN forces and concludes that "sometimes a non-UN peacekeeping force may be more appropriate than a UN one, and that occasionally it may be the only way of dealing with a peacekeeping task" (p.39).

Paper III, "The application of technology to peacekeeping (pp. 43-53), by James Wallen is abstracted separately (see abstract B17(A83)).

Jonathan Alford's paper, "Confidence-building measures and border security" (pp. 55-61), suggests that, in addition to providing a buffer between forces, peacekeeping forces can act as a "transmission belt" for the provision of information. A peacekeeping force with modern surveillance technology can acquire information on the military activities of both sides and with this information clarify disputes.

This function might deter prohibited activities if the surveillance information is known to be shared with both sides. However, parties might be suspicious about the peacekeepers' withholding (or passing on) of sensitive military intelligence.

Surveillance methods suggested by Alford include aerial reconnaissance, active and passive ground-based sensors along with an active patrolling policy. Aerial reconnaissance by itself is inadequate because of ambiguities in photo interpretation and a slow response time. Radar, seismic detectors, intruder alarms and electronic "fences" can provide more immediate information, but these sensors are subject to "spoofing" or accidental triggering and activities can be hidden from them. Follow-up investigation must be done by inspection patrols. Placing too much faith in sensor technology overlooks the importance of the human dimension of peacekeeping.

B19(A84)

B19(A84)

Proposal Abstract B19(A84)

1. Arms Control Problem:

Regional arms control - demilitarization
- Middle East

2. Verification Type:

- (a) On-site inspection - general
- (b) Short-range sensors - monitoring devices
 - seismic sensors
 - acoustic sensors

3. Source:

Florini, Ann and Nina Tannenwald. On the Front Lines: The United Nations Role in Preventing and Containing Conflict. New York: United Nations Association of the United States of America, 1984.

4. Summary:

This booklet examines the role of the United Nations in managing and resolving local conflicts in the Middle East, Africa and elsewhere, with particular emphasis on peacekeeping operations. Part I provides historical background on the operations in Suez, Lebanon, Sinai and Cyprus. Part II presents the policy issues confronted by the UN system so that interested groups may discuss them. A section entitled "Technology and Peacekeeping" (pp. 33-34) describes the use of sensitive electronic surveillance equipment in observation by the Sinai Field Mission (SFM) from February 1976 to January 1980.

Along with the second United Nations Emergency Force (UNEF II), the SFM monitored the 1975 Egyptian - Israeli cease-fire and disengagement in the Sinai Peninsula. The SFM was responsible for monitoring two strategic passes within one buffer zone. The 160 member mission was drawn solely from American civilians, not soldiers, and used sophisticated surveillance equipment to monitor a 250 square mile area for unauthorized intrusions. The equipment used included unattended seismic, infra-red, strain-sensitive and acoustic sensors at both ends of each of the two passes. Radio transmissions from the sensors to personnel at one of three watch stations permitted them to determine the location, speed, direction and approximate weight-scale of an intrusion. Sophisticated binoculars and other visual surveillance equipment facilitated visual identification of vehicles at distances of twenty kilometres during the day and five kilometres at night. Once intrusions were detected, the SFM notified Egyptian, Israeli and UN authorities within minutes. Ninety incidents were reported during the four years of monitoring, but all were deemed to be minor or accidental violations.

With the end of UNEF II's mandate after the Egyptian-Israeli Peace Treaty of 1979, the SFM took over surveillance of a 15,000

square mile area with no increase in personnel. The Mission performed well until its replacement in 1982 by the Multinational Force and Observers. The experiences of the Mission demonstrated the utility of electronic surveillance methods. Reduced personnel requirements kept costs low and monitoring was performed with a high degree of confidence. However, the wider application of these methods may be problematic. The SFM benefited from a restricted geographical area and the trust of both parties to the agreement. Future peacekeeping missions will likely be drawn from a number of different nations (rather than only one, as in the case of the SFM) which possess technology with different levels of sophistication. Some countries may not have the expertise to operate surveillance equipment and UN peacekeeping commanders do not have much experience in deploying and utilizing such equipment. Since the permanent members of the Security Council usually do not participate in peacekeeping forces, access to technology and expertise may be a problem, but the United States already supplies UN peacekeeping forces and technologically advanced states such as the Scandinavian countries and Austria do participate in peacekeeping operations. Further contributions of technology from advanced countries will assist the development of low-cost, high-confidence monitoring capabilities for peacekeeping.

B20(A84)

B20(A84)

Proposal Abstract B20(A84)

1. **Arms Control Problem:**
Regional arms control - demilitarization
2. **Verification Type:**
 - (a) On-site inspection - general
 - (b) Remote sensors - aerial
3. **Source:**
International Peace Academy. Peacekeeper's Handbook. Second Edition. New York: Pergamon Press, 1984. See also: Abstract B14(A78).
4. **Summary:**

This book is intended as a manual for third parties who are acting as a peacekeeping force; "in effect, it is a compendium of peacekeeping data on which national governments can base any preparatory instruction they might wish to implement in their armed forces" (p. 3). As such, most of the data is not relevant to verification, but some specific procedures are laid down which pertain to the supervisory duties of the peacekeeper. These are: (1) observation, (2) surveillance and supervision, (3) interposition, (4) patrolling and reporting, (5) investigation of complaints, (6) negotiation and mediation, and (7) information gathering. Of these, (1), (2), (4), (5), and (7) are essentially exercises in verification and warrant further consideration as proposals for verification in themselves.

Observation: This is denoted as one of the basic functions of a peacekeeping force. It requires that the observer monitor all goings on in his area and provide prompt, accurate reports on any suspicious incident. Factual, timely, accurate and objective reporting is of the utmost importance. Observation is carried out through a number of means; it may require observation posts, the deployment of peacekeeping squads in sensitive areas, the manning of checkpoints, extensive patrolling, fact-finding, inspection, investigation and aerial reconnaissance.

Surveillance and Supervision: Surveillance and supervision are defined as "the agents used for ensuring that agreements made by the parties to a dispute may be implemented" (p. 89). Various activities such as ceasefires, military deployments, exchange of territory or military withdrawals require some form of supervision. Armament control agreements must also be supervised, and a peacekeeping force would be required to identify the zones, define and describe the restricted categories of armaments, and establish procedures for regular inspection of limitation zones. Measures must be thorough and conscientious in order to be effective: "Much will depend upon the degree of cooperation that the inspection and monitoring teams receive from all parties concerned" (p. 94).

Patrolling and Reporting: It is asserted that patrolling must be vigorous, and requires "complete freedom of movement" if it is to be fully effective. It serves four basic purposes - information gathering, investigation, supervision, and publicizing a presence - and may be carried out by vehicle, on foot or in the air. As such, it is essentially a rather intrusive form of on-site inspection. Patrolling must be thorough, and should be governed by clear-cut procedures which are tailored to the specific aims of a given patrol.

Investigation of Complaints: Here, the peacekeeping force is required to "investigate allegations or complaints made by one of the protagonists about another" (p. 114). It is important that all complaints be investigated without exception, and should be dealt with in an objective fashion. Investigations should be as factual, thorough and impartial as possible, and observance of a strict procedure will provide some measure of assurance that all sides are treated equally and fairly.

Information and Intelligence: As a rule, the United Nations avoids the use of covert sources of intelligence, and instead relies on open observation as a more objective means of gathering information. This method has the added advantage of helping to "create confidence and trust", which in turn "helps to strengthen the position of the peacekeeping force in the eyes of the disputants and encourages a less reserved and secretive attitude on the part of the latter" (p. 120).

B21(A84)

B21(A84)

Proposal Abstract B21(A84)

1. **Arms Control Problem:**
Regional arms control - demilitarization
2. **Verification Type:**
On-site inspection - general
3. **Source:**
Rikhye, Indar Jit. The Theory and Practice of Peacekeeping. London: C. Hurst and Company, 1984.
4. **Summary:**
This book is a companion to the author's earlier book The Thin Blue Line: International Peacekeeping and its Future (see abstract B12(A74)). The new book provides an update of developments and political trends in international peacekeeping. It gives an account of and evaluates the activities of a number of United Nations peacekeeping and observer missions in the Middle East, the Congo, Cyprus and Namibia. The book also discusses peacekeeping by regional organizations including the League of Arab States, the Organization of American States, the Organization of African Unity and the Commonwealth. One chapter focusses on the question of managing peacekeeping missions. The book contains a number of maps which supplement explanations.

B22(A85)

B22(A85)

Proposal Abstract B22(A85)

1. **Arms Control Problem:**

Regional arms control - demilitarization
- Middle East

2. **Verification Type:**

On-site inspection - general

3. **Source:**

James, Alan. "Symbol in Sinai: The Multinational Force and Observers". In Peacekeeping and Confidence-Building Measures in the Third World, pp. 16-31. Edited by Hugh Hanning. New York: International Peace Academy, 1985.

4. **Summary:**

In this study of the Multinational Force and Observers (MFO) in the Sinai, a non-United Nations peacekeeping force, James describes the different ways in which the MFO has helped to maintain peace in the Sinai after Israel's withdrawal following the signing of the Egyptian-Israeli Peace Treaty in March 1979. One function of the MFO has been to verify through observation that no Egyptian or Israeli armed forces have entered certain specified zones. Three infantry battalions maintain observation posts and checkpoints which provide 24 hour surveillance. Regular patrols on foot, by vehicle and by helicopter are conducted and night vision devices facilitate surveillance tasks at night. Regular reports are filed from all check-points and any unusual activity is immediately reported to headquarters. The Italian Coastal Patrol Unit monitors the Strait of Tiran to ensure that it is kept open for international navigation. Sea patrols operate for 12 out of every 24 hours, but there is also continuous observation of the Strait from land.

B22.1(A85)

B22.1(A85)

Proposal Abstract B22.1(A85)

1. Arms Control Problem:

Regional arms control - demilitarization
- Europe
- Middle East

2. Verification Type:

(a) On-site inspection - general
- control posts
(b) Short-range sensors - monitoring devices
(c) Remote sensors - aerial

3. Source:

Barton, David. "The Sinai Peacekeeping Experience: A Verification Paradigm for Europe". In Stockholm International Peace Research Institute. World Armament and Disarmament Yearbook: 1985, pp. 541-564. London: Taylor and Francis, 1985.

4. Summary:

The author first reviews the Sinai peacekeeping experience of 1975 to 1982 which he divides into two phases. The first phase - the early warning phase - began with the Second Sinai Disengagement Agreement of 1 September 1975. The second phase - the verification/inspection phase - began with the Egyptian-Israeli Peace Treaty of 26 March 1979. The author outlines the elements involved in the early warning and verification systems used including details of the ground sensor system. The original sensors used in Sinai early warning systems were standard equipment. These and later improvements maintained a record of good performance and low maintenance. The early warning system was effective in detecting intrusions, monitoring them, verifying whether they were violations and securing corrective actions. Both sides came to trust the system. The early warning system was eventually dismantled (25 January 1980) after the Peace Treaty came into force.

The author suggests that the Sinai experience has several features illustrating its potential usefulness as a model for Europe and elsewhere.

- (1) A successful verification regime can help political security-building processes.
- (2) Political gestures can produce an environment which requires that solutions be found to technical problems. Technical know-how and ingenuity can be found if the political will is present.
- (3) A trusted third party can help ensure success in operating a verification regime. Such a third party might be difficult to find for central Europe. A joint NATO/WPO group might be created. Consultative commissions could monitor compliance,

exchange military information and serve as a forum for dialogue on military strategy and doctrine.

- (4) High-level military commissions can provide effective decision-making, planning and arbitration for the verification regime.
- (5) The success of Sinai can be repeated elsewhere. Technical improvements suggest a that 75% reduction in reliance on visual observation posts and border patrols could realized. A verification system could be introduced in the Fulda Gap or along the inter-German border. Such a trial verification zone could serve as a testing ground regarding the verification of a wide range of force limitations.
- (6) Treaties and agreements provide the basis for the task of verification.
- (7) A combination of forces from different nations and organization can successfully work together in a verification system.
- (8) Zones which gradually thin out military forces along borders can reduce the treat of attack.
- (9) Inspection to detect violations need not be offensive in terms of revealing military intelligence data.
- (10) Demilitarized and buffer zones can be effective barriers to military activity. They can make a marginal but important difference in limiting military attack options.
- (11) The marginal improvement in warning time provided by an early-warning system and demilitarized zone can make an important difference. Such systems can also make warning less ambiguous.
- (12) Military asymmetries do not have to be altered before Sinai-type arrangements are made.
- (13) A successful verification regime can defuse a crisis.

Several factors must be examined to determine whether the implementation of a trial early warning and verification system in central Europe modelled on Sinai is feasible. The terrain in Europe is different but like that of Sinai tends to channel attacking forces, suggesting that attack routes could be monitored, though more sensors and watch stations will be needed. Aerial reconnaissance over central Europe would require greater capabilities than for Sinai, but these exist. Such aerial surveillance requirements would probably be less than for military intelligence operations. While the central Europe region has more "clutter" to be filtered out by the verification system, it might not be as serious a problem as expected. Only a trial system can determine this.

Political factors also differ between Sinai and central Europe. For example, there has been 40 years of peace in Europe. A limited monitoring system already exists in Europe in the Four Powers Agreement. This fact and the recent position of the WPO accepting entry/exit points in an MBFR context suggest that watch stations might be acceptable to WTO and NATO.

There are also different military circumstances between the Sinai and Europe.

Despite the differences, the author concludes that the Sinai experience is adaptable enough to recommend itself as a model for Europe, especially on a trial basis. Such a trial could bring about improvement in European security and encourage the adoption of more ambitious arms control measures. "Since early warning and verification capabilities superior to those used in Sinai already exist on both sides of the border in central Europe, it is their application in an arms control context and their public demonstration which would be the important feature of such a trial zone" (p. 542).

B22.2(A87)

B22.2(A87)

Proposal Abstract B22.2(A87)

1. Arms Control Problem:

- (a) Regional arms control - demilitarization
 - Middle East
 - Europe
- (b) Any arms control agreement

2. Verification Type:

- (a) On-site inspection - general
 - selective
 - control posts
- (b) Remote sensors - aerial
 - satellite
- (c) Short-range sensors - monitoring devices
- (d) Complaints procedures - consultative commission
- (e) Verification - general

3. Source:

Mandell, Brian S. The Sinai Experience: Lessons in Multimethod Arms Control Verification and Risk Management. Arms Control Verification Studies, no. 3. Ottawa: Department of External Affairs, 1987.

4. Summary:*

This study examines the application of a system of multimethod, interlocking verification procedures used for ensuring compliance with the Sinai I Agreement of 1974, the Sinai II Agreement of 1975 and the Egypt-Israel Peace Treaty of 1979. These methods included ground-based early warning systems, aerial and satellite reconnaissance and on-site inspection, undertaken by both third parties and the parties themselves. In addition to chronicling the process of Egyptian-Israeli disengagement of forces during the years 1973-1982, the complex interrelationship between surveillance technology, peacekeeping and confidence-building is analyzed with a view toward identifying the pre-requisites for the success of the Sinai model. A number of factors -- political, military, geographical and technical -- integrated in a unique manner were responsible for the success of the Sinai operation.

Guiding the case-study analysis are six propositions which seek to challenge some of the conventional wisdom regarding the prospects for regional arms control and verification. These are:

Proposition 1:

Arms control and verification regimes can be created and sustained in regions plagued by endemic violence.

* Author's summary.

Proposition 2:

Third parties can facilitate the creation of arms control regimes as well as assist the parties in verifying new agreements.

Proposition 3:

Effective verification measures can make a significant contribution to risk management and confidence-building in disputes where there is little or no history of conflict management.

Proposition 4:

Technology-intensive verification procedures can be integrated with more traditional kinds of peacekeeping operations in order to strengthen the compliance process.

Proposition 5:

With appropriate modification, elements of the Sinai model can be applied to other regional conflict settings.

Proposition 6:

Third parties, including countries like Canada, can make a significant contribution to the verification of regional arms control agreements.

The analysis of the Sinai case-study confirms, in varying degrees, all the propositions noted above. Three principal findings of the study are, however, especially noteworthy. First, verification can contribute significantly to risk management and confidence-building and thus provide the necessary impetus for more far-reaching arms control and verification arrangements. In the immediate aftermath of hostilities, when confidence is virtually non-existent, the verification system serves an important risk reduction function by dampening incentives for surprise attack, providing adequate early warning and clarifying ambiguous activities.

Once the verification system has withstood the initial "litmus test" of intentions, thereby strengthening the position of those in power who opted for a policy of disengagement rather than confrontation, then compliance with the verified agreement will build confidence over time to the point where defection from the agreement is seen as politically and strategically counter-productive. The Sinai case strongly suggests the extent to which confidence emanating from the successful verification of a military agreement preceded and ultimately advanced political accommodation between the parties such that the signing of a peace treaty was possible. Moreover, the synergistic integration of individual verification components (in the form of unattended ground sensors with on-site and aerial inspections) clearly illustrated that procedures which worked well in the past could facilitate both the negotiation and implementation of a new verification regime. Hence effective verification may lead to a positive "spillover" effect.

A second important finding of the study suggests that the core elements of the Sinai model -- a disengagement agreement composed of a demilitarized buffer zone flanked by zones of limited forces, and all verified by a system of multiple interconnecting verification techniques -- could, with appropriate modification to account for variations in mission, terrain and number of borders and parties, do

much to strengthen stability in numerous regional conflict settings. Should the appropriate political conditions for an agreement pertain, the most suitable candidates for the Sinai model include: the Golan Heights; the Jordan River Valley/West Bank; the Israel-Lebanon border; and the Fulda Gap/Intra-German border area of Central Europe. In addition there are other prima facie cases where the Sinai model may have some application including various borders in Central America in the context of the Contadora process, Northern Ireland, Western Sahara, South Africa/Namibia, India/Pakistan and Iran/Iraq as part of a postwar settlement.

The third principal finding suggests that third parties, acting unilaterally or multilaterally, can play an important role in designing and implementing verification procedures that would complement national means of verification. Third parties may play different roles in the verification process ranging from offering technical and industrial expertise to direct forms of monitoring including participation in multilateral consultative arrangements. In the regional context, where the national technical means of the superpowers may be neither sufficient nor relevant to assure the viability of an agreement, third parties including countries like Canada, may be able to exert greater influence with the local parties. A trend toward the multilateralization of the arms control process, especially at the regional level, may lead to the development of new international norms and procedures whereby parties to an agreement specifically invite other countries to participate in the monitoring of agreements.

B23(G63)

B23(G63)

Proposal Abstract B23(G63)

1. Arms Control Problem:

Regional arms control - Europe

2. Verification Type:

- (a) On-site inspection - general
 - control posts
- (b) Records monitoring - economic
- (c) Remote sensors - aerial
 - satellite

3. Source:

Wainhouse, D.W., ed. Arms Control Agreements: Designs for Verification and Organization. Baltimore: The Johns Hopkins Press, 1968.

4. Summary:

This proposal, originally presented as the Gomulka Plan of 1963, deals with a freeze on the quantity of nuclear weapons stationed in a central European zone to include Poland, Czechoslovakia, West Germany and East Germany. A commitment to refrain from transferring nuclear weapons (but not delivery vehicles) to this area would be undertaken. Furthermore, parties would be obligated not to produce nuclear weapons in the zone and not to introduce nuclear weapons into the zone.

Verification and control would be exercised by mixed commissions of representatives from the Warsaw Pact and NATO on a parity basis. These commissions could be enlarged to include representatives from other states. Periodic meetings of the representatives from other states. Periodic meetings of the representatives of the nuclear powers would be held in order to exchange information and reports in regard to obligations undertaken in the freeze on nuclear weapons.

Specifically, there would be Western Verification Organization (WVO) and an Eastern Verification Organization (EVO). Each would have an administrator, a Headquarters Unit and a number of control units in East Germany four in Poland and three in Czechoslovakia, while the EVO would maintain four control units in West Germany. Control units would report directly to their respective Verification Organizations which would in turn report to the next higher organization established by parties to the agreement.

The process of inspection itself would be carried out both by mobile teams and by stationary control posts. The exchange of military missions, governmental budget and economic record verification and verification by aircraft and satellites could supplement the ground inspection.

B24(T67)

B24(T67)

Proposal Abstract B24(T67)

1. Arms Control Problem:

Regional arms control - nuclear weapons free zone (Article 4)
- demilitarization
- outer space

2. Verification Type:

(a) On-site inspection - general (Article 12)
- obligatory
- non-obligatory (Article 10)
(b) International exchange of information (Article 11)

3. Source:

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies. (The Outer Space Treaty).

Concluded: 27 January 1967.

Enter into force: 10 October 1967.

Number of parties as of 31 December 1986: 89.

See also: "Italian proposal for an additional protocol to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space...", CD/9, 26 March 1979. (Abstract D4(G79)).

4. Summary:

Article 4 outlines the main arms control undertaking of this Treaty. Paragraph (1) commits Parties "not to place in orbit around Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner". Under paragraph (2) the moon and other celestial bodies are to be used "exclusively for peaceful purposes". "The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies" is forbidden.

All installations on the moon or other celestial bodies are open to inspection on the basis of reciprocity. Notice of an inspection must be given to ensure safety of inspectors and to avoid interference with the operations of the installation (Article 12). This inspection does not apply, however, to objects in earth orbit. Provision is also made, though not explicitly as part of the verification system, for permitting, on a voluntary basis, the observation of launches and flights of spacecraft (Article 10).

Text of Main Verification Related Provisions:

Article 10

In order to promote international cooperation in the exploration and use of outer space, including the moon and other celestial bodies, in conformity with the purposes of this Treaty, the States Parties to the Treaty shall consider on a basis of equality any requests by other States Parties to the Treaty to be afforded an opportunity to observe the flight of space objects launched by those States.

The nature of such an opportunity for observation and the condition under which it could be afforded shall be determined by agreement between the States concerned.

Article 12

All stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.

B25(A82)

B25(A82)

Proposal Abstract B25(A82)

1. Arms Control Problem:

Regional arms control - outer space - ASATs

2. Verification Type:

On-site inspection - general

3. Source:

Hafner, D.L. "Anti-satellite Weapons: The Prospects for Arms Control". In Outer Space: A New Dimension of the Arms Race, pp. 311-323. Edited by Bhupendra Jasani. London: Taylor and Francis, 1982.

4. Summary:

The author proposes that control of anti-satellite (ASAT) weapons could be facilitated by expanding the scope of the Outer Space Treaty (1967). He suggests using the 1961 Antarctic Treaty as a model. Article I of the Antarctic Treaty prohibits "any measures of a military nature ... as well as the testing of any types of weapons". He notes that the verification provisions in Article VII (3) provide for "inspection by any (appropriately designated) observers" of all areas of Antarctica. Such provisions would establish an effective ban on ASAT tests or deployments, but the author warns that the prospects for such an agreement are grim because there is no way to ensure that satellites would not and could not be used for military purposes. Verification will be a formidable obstacle and it will be suggested by parties negotiating a ban on ASATs that verification standards must be even more stringent than those for other arms control agreements because of the threat posed by even a limited ASAT capability acquired covertly.

B26(T79)

B26(T79)

Proposal Abstract B26(T79)

1. Arms Control Problem:

- Regional arms control - outer space (Article 3)
- nuclear weapons free zone
- demilitarization

2. Verification System:

- (a) On-site inspection - general (Article 15)
 - obligatory
- (b) Complaints procedure - consultation and cooperation (Article 15)
 - referral to Secretary-General (Article 15)
- (c) Review conference (Article 18)

3. Source:

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies. (The Moon Treaty)
Concluded: 5 December 1979.
Entered into force: 11 July 1984
Number of parties as of 31 March 1986: 7

4. Summary:

Under Article 3 of the Treaty, the moon and other celestial bodies are to be used "exclusively for peaceful purposes". The Treaty prohibits threats or use of force or any hostile act on the moon itself or using the moon as a base for such acts. Nuclear weapons and other weapons of mass destruction are banned from the moon itself, from trajectories to the moon and from orbits around the moon. The establishment of military bases and fortifications, the testing of weapons and military manoeuvres are also banned from the moon.

All space vehicles, facilities, stations and installations on the moon and other celestial bodies are open to other parties (Article 15). Parties are to give reasonable advance notice of a projected visit. Parties may act on their own behalf or with the assistance of another party or through appropriate international procedures within the framework of the United Nations.

If a complaint about fulfilment arises, a party may request consultations with the party complained of. The latter is required to enter into such consultations without delay. Other parties can participate. The UN Secretary-General is to be informed of the results of the consultations and transmit these results to all parties. If the consultations fail, the parties are obliged to resolve the dispute peacefully by other means. Parties can unilaterally seek the assistance of the UN Secretary-General regarding resolution of the complaint.

Article 18 provides that 10 years after the Treaty enters into force, its application will be reviewed by the UN General Assembly. A

review conference can be convened at any time after 5 years after the Treaty comes into force, at the request of one-third of the parties.

Text of Main Verification Related Provisions:

Article 15

1. Each State Party may assure itself that the activities of other States Parties in the exploration and use of the moon are compatible with the provisions of this Agreement. To this end, all space vehicles, equipment, facilities, stations and installations on the moon shall be open to other States Parties. Such States Parties shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited. In pursuance of this article, any State Party may act on its own behalf or with the full or partial assistance of any other State Party or through appropriate international procedures within the framework of the United Nations and in accordance with the Charter.

2. A State Party which has reason to believe that another State Party is not fulfilling obligations incumbent upon it pursuant to this Agreement or that another State Party is interfering with the rights which the former State has under this Agreement may request consultations with that State Party. A State Party receiving such a request shall enter into such consultations without delay. Any other State Party which requests to do so shall be entitled to take part in the consultations. Each State Party participating in such consultations shall seek a mutually acceptable resolution of any controversy and shall bear in mind the rights and interests of all States Parties. The Secretary-General of the United Nations shall be informed of the results of the consultations and shall transmit the information received to all States Parties concerned.

3. If the consultations do not lead to a mutually acceptable settlement which has due regard for the rights and interests of all States Parties, the parties concerned shall take all measures to settle the dispute by other peaceful means of their choice appropriate to the circumstances and the nature of the dispute. If difficulties arise in connection with the opening of consultations or if consultations do not lead to a mutually acceptable settlement, any State Party may seek the assistance of the Secretary-General, without seeking the consent of any other State Party concerned, in order to resolve the controversy. A State Party which does not maintain diplomatic relations with another State Party concerned shall participate in such consultations, at its choice, either itself or through another State Party or the Secretary-General as intermediary.

B27(G69)

B27(G69)

Proposal Abstract B27(G69)

1. Arms Control Problem:

(a) Regional arms control - sea bed

2. Verification Type:

(a) On-site inspection - general

- non-obligatory

(b) Complaints procedure - consultation and cooperation

- referral to Security Council

3. Source:

Canada. CCD/270, 8 October 1969.

See also: - UNGA, A/C.1/992, 27 November 1969

- ENDC/PV.424, 31 July 1969.

4. Summary:

The Canadian paper proposed that each party have the right to "verify through observation" the activities of other parties on the sea bed provided that such observation did not interfere with those activities or infringe on any rights recognized by international law. (Paragraph 1).

If reasonable doubts remained after such observation the party having these doubts and the party under suspicion were to consult and cooperate with a view to removing the doubts. Cooperative procedures were to include "appropriate inspection" of objects, structures, etc. which might reasonably be expected to be of a kind that had been banned. Parties in the region of the activities and any other party who so requested were to be notified of and permitted to participate in the consultations and cooperation. (Paragraph 2)

A special procedure was outlined for dealing with cases where the state responsible for the object, structure, etc. was not identifiable by observation. (Paragraph 3)

If doubts remained after consultation and cooperation, a complaint could be referred to the Security Council. (Paragraph 4)

Verification could be undertaken by any party using its own means or with the assistance of any other party. Such assistance could be sought directly or indirectly through the good offices of the UN Secretary General. (Paragraph 5)

All verification activities were to be conducted with due regard for the rights of coastal states. (Paragraph 6)

B28(G69)

B28(G69)

Proposal Abstract B28(G69)

1. Arms Control Problem:

- (a) Regional arms control - sea bed

2. Verification Type:

- (a) On-site inspection - general
- (b) Remote sensors
- (c) Complaints procedure - consultation and cooperation
- (d) Review conference

3. Source:

United States. "Draft treaty prohibiting the emplacement of nuclear weapons and other weapons of mass destruction on the sea bed and ocean floor". ENDC/249, 22 May 1969.

4. Summary:

The object of the draft treaty was to prohibit the emplacement on the sea floor of nuclear weapons, other weapons of mass destruction and their related launching facilities (Article 1).

To verify compliance parties were to be "free to observe activities of other states on the sea bed" provided that this observation did not interfere with such activities or otherwise infringe existing rights under international law. Should such observation still leave doubts unresolved, parties were to consult and cooperate with a view to removing these doubts (Article 3(1)).

A review conference was to be held five years after the entering into force of the Treaty. One of the purposes of this conference was to "take into account any relevant technological developments" (Article 5). This conference was to consider whether additional rights and procedures of verification should be adopted. (Article 3(2)).

B28(G69)

B28(G69)

Proposal Abstract B28(G69)

1. Arms Control Problem:

(a) Regional arms control - sea bed

2. Verification Type:

(a) On-site inspection - general

(b) Remote sensors

(c) Complaints procedure - consultation and cooperation
- referral to Security Council

(d) Review conference

3. Source:

United States/Union of Soviet Socialist Republics. "Draft treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea bed and the ocean floor and on the sub-soil thereof". ENDC/269/Rev.1, 30 October 1969.

4. Summary:

The object of the draft treaty was the prohibition of emplacement on the sea bed of nuclear weapons, other weapons of mass destruction and their associated facilities. (Article 1).

To verify compliance parties were to have "the right to verify the activities of other states parties to the Treaty" provided such verification did not interfere with these activities nor infringe existing rights under international law including freedom of the high seas. (Article 3(1)).

Each party could verify activities of others using its own means or with the assistance of any other state party. (Article 3(2)).

Parties were obligated under the treaty to consult and cooperate with the view to removing any doubts concerning compliance. If such consultation and cooperation did not remove doubts then any serious questions were to be referred to the Security Council.

B30(T71)

B30(T71)

Proposal Abstract B30(T71)

1. **Arms Control Problem:**
Regional arms control
2. **Verification Type:**
 - (a) On-site inspection - general ("right of observation")
- non-obligatory (Article 3 (2))
 - (b) Complaints procedure - consultation and cooperation (Article 3(2))
- referral to Security Council (Article 3(4))
 - (c) Review conference (Article 7)
3. **Source:**

Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil Thereof. (The Sea Bed Treaty).

Concluded: 11 February 1971.

Entered into force: 18 May 1972.

Number of parties as of 31 December 1986: 76.

See also: Review Conference of the Parties to the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil Thereof. Final Document 29 July 1977, SBT/CONF/25.

4. **Summary:**

The principle obligation of this Treaty is set forth in Article 1. It prohibits the emplacement on the sea bed of nuclear weapons or any other weapons of mass destruction, as well as structures, launching installations or any other facilities designed for storing, testing or using such weapons.

The verification provisions of the final Sea Bed Treaty were based in large part on the Canadian working paper presented in the First Committee of the General Assembly*. The provisions of Article 3 involve observation of activities in the sea bed zone followed, in the event of a suspected violation, by consultations between the states having reasonable doubts about an activity and the state responsible for the activity. Should these consultations fail to resolve the dispute, procedures are stipulated for notification of other parties in order to cooperate on further verification including inspection. It is unclear whether such inspection would be obligatory as regards

* See abstract B27(G69).

the state which was being inspected. If the dispute still remains unresolved, there is a provision for referral to the Security Council.

There is a special procedure for installations, devices, etc. whose state owner is not identified (Article 3(3)). Verification may be conducted with the assistance of third parties including other states of the UN (Article 3(5)). Finally, Article 3(6) attempts to protect the rights of other states (including those using the high seas and coastal states) from being infringed when verification activities are undertaken.

A Review Conference of the Sea Bed Treaty was held from 20 June to 1 July 1977 as per Article 7 of the Treaty. The conference noted that no party had found it necessary to invoke the verification provisions in Article III. It also considered that the provisions for consultation and cooperation contained in paragraph 2, 3 and 5 of Article 3 included the right of parties "to agree to resort to various international consultative procedures such as ad hoc consultative groups of experts and other procedures" (Final Declaration).

Text of Main Verification Related Provisions:

Article 3

1. In order to promote the objectives of an insure compliance with the provisions of this Treaty, each State Party to the Treaty shall have the right to verify through observation the activities of other States Parties to the Treaty on the sea bed and the ocean floor and in the subsoil thereof beyond the zone referred to in Article 1, provided that observation does not interfere with such activities.
2. If after such observation reasonable doubts remain concerning the fulfilment of the obligations assumed under the Treaty, the State Party having such doubts and the State Party that is responsible for the activities giving rise to the doubts shall consult with a view to removing the doubts. If the doubts persist, the State Party having such doubts shall notify the other States Parties, and the Parties concerned shall co-operate on such further procedures for verification as may be agreed, including appropriate inspection of objects, structures, installations or other facilities that reasonably may be expected to be of a kind described in Article 1. The Parties in the region of the activities, including any coastal State, and any other Party so requesting, shall be entitled to participate in such consultation and cooperation. After completion of the further procedures for verification, an appropriate report shall be circulated to other Parties by the Party that initiated such procedures.
3. If the State responsible for the activities giving rise to the reasonable doubts is not identifiable by observation of the object, structure, installation or other facility, the State Party having such doubts shall notify and make appropriate inquiries of States Parties in the region of the activities and of any other State Party. If it is ascertained through these inquiries that a particular State Party is responsible for the activities, that State Party shall consult and co-operate with other Parties as provided in paragraph 2 of this Article. If the identity of the State responsible for the activities cannot be ascertained through these inquiries, then further

verification procedures, including inspection, may be undertaken by the inquiring State Party, which shall invite the participation of the Parties in the region of the activities, including any coastal State, and of any other Party desiring to co-operate.

4. If consultation and cooperation pursuant to paragraphs 2 and 3 of this Article have not removed the doubts concerning the activities and there remains a serious question concerning fulfilment of the obligations assumed under this Treaty, a State Party may, in accordance with the provisions of the Charter of the United Nations, refer the matter to the Security Council, which may take action in accordance with the Charter.

5. Verification pursuant to this article may be undertaken by any State Party using its own means, or with the full or partial assistance of any other State Party, or through appropriate international procedures within the framework of the United Nations and in accordance with its Charter.

B31(I82)

B31(I82)

Proposal Abstract B31(I82)

1. Arms Control Problem:

Military budgets

2. Verification Type:

- (a) On-site inspection - general
 - selective
 - challenge
 - sampling
- (b) Remote sensors
- (c) Short-range sensors
- (d) Records monitoring - economic
- (e) Literature survey - budgetary analysis
- (f) International control organization
- (g) International exchange of information
- (h) Complaints procedure - consultation and cooperation

3. Source:

United Nations. "Reduction of military budgets: Report of the Secretary-General". Document A/S-12/7, 6 May 1982.

See also: United Nations. Secretary-General. "Reduction of military budgets: International reporting of military expenditures". Document A/35/479, 21 October 1980 (see abstract L7(I80)).

4. Summary:

This report makes suggestions to refine the proposed international reporting instrument based on comments from states. It also examines the problems of comparing military expenditures and verifying a future agreement on reduction of military expenditures (RME).

Only minor changes in the general guidelines of the reporting instrument are recommended. The new guidelines call on states to report on all types of force groups and all categories of resource costs, even if data is unavailable, by including them in one or more of the other force groups or at least in the total.

With regard to verification of RME, the report considers the purposes and criteria for verification, general requirements of verification, and variables in agreements on RME. Specific methods of verification considered include:

- (a) Inspection (general, selective, challenge),
- (b) Remote sensing (by national technical means or on-site means),
- (c) Complaint/consultation/cooperation procedures,
- (d) Commission or similar monitoring body established by treaty, and
- (e) Exchange of information.

General on-site inspection would provide adequate access to records and information, but would not likely be acceptable because of excessive intrusiveness. Selective and challenge on-site inspections would be insufficient to confirm correspondence between declared expenditure data and actual records, but they could play a role in authenticating selected expenditure or economic data.

Remote sensing by national technical means can help authenticate selected economic data by enabling estimation of quantities that are then combined with price data to produce expenditure estimates. However, this method suffers from a lack of accuracy. Non-interference with national technical means of verification should be incorporated into any agreement.

Consultation and cooperation would be important to aid the solution of problems arising from comparisons of data. Commissions, councils or other bodies could be set up to facilitate verification in this way.

Exchange of information relating to military expenditures in combination with literature surveys should provide high levels of confidence for verification of expenditures in countries which provide abundant information. However, in other countries, concealment of information might be possible so that non-intrusive verification would be inadequate. Sampling of payment documents through the highly centralized banking system of some countries could be used to verify declared expenditure data with less intrusiveness. Obstacles here include objections to the intrusive nature of even limited sampling and the possibility of payment flows which bypass the central bank. Other proposed measures include a "voluntary demonstration of compliance" involving a team of economic specialists on each side presenting data to convince the other side of compliance. A so-called "building-block" method estimates major physical inputs into armed forces (men, weapons and equipment) and combines the quantities with price estimates to calculate an estimate of total and component expenditures. This method is not very reliable because of inadequate knowledge of domestic prices and appropriate conversion rates, therefore it is of little use in verification.

B32(A77)

B32(A77)

Proposal Abstract B32(A77)

1. Arms Control Problem:

Nuclear weapons

2. Verification Type:

- (a) On-site inspection - general
- (b) International control organization

3. Source:

Rathjens G. "The Conditions Necessary for Complete Disarmament - The Case for Partial Nuclear Disarmament". In A New Design for Nuclear Disarmament: Pugwash Symposium, Kyoto, Japan, pp.132-4. Edited by W. Epstein and T. Toyoda. London: Pugwash, 1977.

4. Summary:

The author contends that to prevent the acquisition of nuclear weapons in a nuclear disarmed world several dramatic changes in the international system would be needed, tantamount to something like world government. All countries would have to accept intrusive inspection to preclude weapons manufacture which would include frequent inspection of very large numbers of industrial facilities and laboratories including the right to search virtually anywhere. Unrestricted access would be particularly necessary in the case of states which previously had nuclear weapons. Practically speaking, what is required is an international authority with rights of inspection that will be far more intrusive than has so far been accepted by national states.

To ensure timely access to any suspected installation where nuclear weapons might be stored or produced, the international authority must have sufficient forces to overcome resistance rapidly (i.e. stronger than residual police or military forces in any state).

Additional measures might include establishment of rewards and rights of asylum for persons disclosing proscribed activities, monitoring training programs of national police or armies, and facilitating frequent exchanges of different nationals in laboratories, industrial establishments and national police and military staffs.

B33(A78)

B33(A78)

Proposal Abstract B33(A78)

1. Arms Control Problem

- (a) Nuclear weapons - ballistic missiles
 - cruise missiles
 - manned aircraft
- (b) Regional arms control - Europe
 - nuclear weapons free zone

2. Verification Type:

- (a) On-site inspection - general
- (b) Remote sensors

3. Source:

Coffey, J. "Arms Control and Tactical Nuclear Forces and European Security". In Stockholm International Peace Research Institute, Tactical Nuclear Weapons: European Perspectives, pp.175-203. London: Taylor and Francis, 1978.

4. Summary:

Coffey reviews several approaches to controlling tactical nuclear forces in Europe. Control of tactical nuclear delivery vehicles in Europe with some minor exceptions is verifiable; their numbers are fairly well known, they are difficult to hide and the intelligence networks of both NATO and the Warsaw Pact are probably sufficiently good to ensure against gross violations. Verifying the removal of tactical nuclear warheads from the area would, however, be more difficult. While it would be relatively easy to verify that they had been transferred out of the area, it would be harder to check on remaining stocks without some intrusive inspection and it would be virtually impossible to preclude weapons from being moved back in again. Similarly, verifying compliance with the creation of a nuclear weapons free zone would require knowledge of procedures for supplying nuclear warheads and some intrusive inspection without advance notice.

Controlling the introduction of new weapons into the area would be hard. It would be almost impossible to preclude gradual alterations in weapons system. While it is possible to inhibit development of new weapons when these reach the test stage by restricting testing or numbers that can be deployed, it is hard to cover all the kinds of systems that can play a nuclear role. Once weapons are introduced into inventory it is possible to readily identify new types but the multiple roles of some system means that it is difficult to get agreement on their restriction. Such restrictions on new weapons because of the verification difficulties should be limited to important, relatively scarce and highly visible weapons. Checks on features such as the yield or degree of radioactivity of nuclear warheads would be virtually impossible.

B34(A61)

B34(A61)

Proposal Abstract B34(A61)

1. **Arms Control Problem:**
Conventional weapons - ground forces
2. **Verification Type:**
 - (a) On-site inspection - sampling
 - (b) International exchange of information
3. **Source:**
Wiesner, J.B. "Inspection for Disarmament". In Arms Control: Issues for the Public, pp.134-135. Edited by L. Henkin. Englewood Cliffs, New Jersey: Prentice-Hall, 1961.
4. **Summary:**

This proposal begins by assuming an initial mandatory disclosure of numbers and locations of all conventional weapons and troops at the time the agreement becomes effective. The use of sampling techniques applied to on-site inspection, as well as intelligence sources, should permit good assurance of the veracity of the disclosures. As forces are de-mobilized and their weapons destroyed inspection teams would carry out surveillance operations to ensure that levels were not augmented. Weapons destruction would be carried out under supervision by the inspectorate. Factories engaged in heavy arms production would also be monitored.

(a) Conventional weapons - ground forces
- aircraft
(b) Regional arms control - Europe

- (a) On-site inspection - general
 - selective
 - control posts
- (b) Remote sensors - aerial
- (c) Short-range sensors - monitoring devices

United States Arms Control and Disarmament Agency. Field Operations Division. Weapons Evaluation and Control Bureau. Summary Report
Field Test F-15 Exercise First Look: Inspection and Observation of
Retained Levels of Ground and General Purpose Air Forces in a
Specified Area (UK), February 1970.

- Final Report Field Test FT-15 Exercise First Look:
Procedures Manual, February 1970.

Despite technological advances since the time when this study was conducted, it remains pertinent to modern arms control inspection schemes intended to monitor conventional forces, in terms of both its findings and conclusions.

Field Test FT-15 was conducted over thirteen weeks in the spring of 1968 in a 2,000 square mile area of southern England. A table of test exercises which led up to FT-15 is provided in Table 1 of this abstract. FT-15 involved personnel from the armed forces of the UK and the US. The aim of the test was to evaluate performance of different inspection organizations operating in a foreign environment against foreign military forces. Several configurations were tested to obtain information regarding a number of specific objectives. Variables included:

- (1) number of inspection teams,
- (2) degree of access to installations,
- (3) availability to inspectors of aerial reconnaissance data,
- (4) availability to inspectors of data from unattended ground sensors,
- (5) use of aerial reconnaissance data alone,
- (6) use of unattended ground sensor data alone,
- (7) use of aerial reconnaissance data and unattended ground sensor data in combination,

- (8) use of declarations by host,
- (9) problems with data handling procedures,
- (10) detection of evasion,
- (11) degree of intrusiveness, and
- (12) operational problems.

Test design:

Twenty ground inspection team configurations were tested each involving different combinations of the following variables: number of teams in the inspection group, access to installations, use of aerial surveillance data and use of unattended ground sensor data.

Three special inspection techniques were tested. One used aerial reconnaissance data alone, one used ground sensor data alone, and the third used a combination of both.

The basic assignment for each inspection group was to determine the force level (order of battle) of the army and air force units in the inspection area and to update their findings whenever changes occurred. The performance of the groups was evaluated by the average percentage errors made in estimating various categories of military strength (eg. number of personnel, number of different kinds of military equipment, identifying units by name and specifying locations). This error rate was based on the absolute difference between estimates by inspection groups and the actual number of targets present. Both underestimates and overestimates were counted as errors.

Results:

- (1) The overall performance of all inspection groups had errors in excess of 20% for all tasks. This was true even for the high access groups though they did better than the low access ones.
- (2) There was a wide variation in the performance of different inspections groups in the accuracy of their estimates.
- (3) The performance of the inspection groups with few teams was particularly poor under low access conditions. Under high access their performance was not much different from groups with more teams, indicating that the effect of the number of teams was less important than degree of access permitted.
- (4) Ground inspection groups did not make much use of aerial reconnaissance data because they were not trained to interpret it.
- (5) Aerial reconnaissance performed well for some types of targets (e.g. vehicles) but poorly in other contexts (e.g. artillery). Aerial surveillance alone and ground inspections alone performed best against different types of targets suggesting that an effective inspection system would include a combination of both these techniques.
- (6) The ground sensor system was not operational for sufficient time to produce significant results. There were indications, however, that the contribution of such sensors would be limited to monitoring military 'choke' points not used by civilians.
- (7) Leadership quality tended to have an important impact on inspection group performance.

- (8) Small inspection groups could not maintain as much inspection per inspector as larger groups because of greater travel requirements.
- (9) Since no overall order of battle assessment procedures were prescribed for the inspection groups, each one developed its own which resulted in major differences in performance. On the basis of work done by intelligence experts, it may be possible to codify rules more comprehensively and in more detail for use by ground inspection teams.
- (10) Inspection groups made little use of declarations made by the host because they did not believe them. For declarations to be really useful to inspection groups they must be very detailed and inspection procedures must be explicitly designed around their use.
- (11) Only minor evasions were attempted none of which provided analyzable results. To determine the detection capability of the inspection groups, large scale evasions over long periods would need to be conducted. These would be costly and interfere with normal training. In an actual arms control situation such evasions would be even more costly and risky.
- (12) Questionnaires submitted to most unit officers on the intrusiveness of the inspectors indicated that they did not find the inspectors very intrusive. However, even in this friendly environment there were some negative reactions suggesting that inspectors in a real arms control situation would have to be very discreet.

Conclusions:

- (1) A ground inspection system alone of the size of existing Military Liaison Missions (which would permit one inspector per thousand miles with access only to base perimeter), cannot be expected to verify an arms limitation relating to general purpose ground and air forces where errors of over 20% are not acceptable.
- (2) Aerial reconnaissance by itself without assistance from other information sources and with similar coverage as provided in FT-15 cannot be expected to suffice within the same limits.
- (3) Unattended sensors can be expected to make contributions only to very special tasks related to general purpose air and ground force verification.
- (4) Because different methods used in observing and estimating target forces were more accurate on different targets, a system with a well integrated combination of aerial surveillance and ground inspection may provide performance with a 10% accuracy for general purpose forces limitations.

As a result of FT-15 a Procedures Manual was produced describing the basis for an arms control inspection system in a developed area such as Central Europe. It assumes that an adequate road network exists for inspector movement and that most military units are designated. There are three sections to the Manual:

- (1) arms control agreement aspects,
- (2) setting up of the inspectorate and requisite logistic support, and
- (3) command and control of the inspectorate. Annexes include sample data reporting forms and data displays to aid inspectorate operations.

TABLE I
TESTS PRIOR TO FT-15

(Source: Final Report Field Tests FT-15 Exercise First Look, vol. I, pp, 1-2)

NAME	DATE	PURPOSE	RESULTS
1. CG-3 'Resident Inspection of an Army Installation' CG-3A 'Aerial Photographic Surveillance of an Army Installation'	1964	<ul style="list-style-type: none"> - to determine the verification capabilities of a small resident inspection team operating on a military installation - to acquire preliminary information on the applicability of aerial photographic reconnaissance to on-site inspection of a military installation 	<ul style="list-style-type: none"> - resident teams could easily maintain an accurate inventory of 3400 vehicles at the installation and simple evasion tactics were easily detected
2. CG-12 'Military Activity Monitoring'	1964	<ul style="list-style-type: none"> - to test inspection methods and performance of observation post teams stationed at road and rail junction, airfields and along geographic or political border areas in monitoring movement of military forces - aerial image reconnaissance over routes of movement also tested 	<ul style="list-style-type: none"> - ground inspection teams, air observation units, and aerial image reconnaissance were all able to detect and identify a large percentage of the military movements passing through monitored road and rail junctions
3. CG-13 'Inspection of Retained Levels of General Purpose Air Forces'	1964	<ul style="list-style-type: none"> - to test various inspection techniques for checking compliance with a postulated agreement limiting personnel, combat aircraft and support facilities of general purpose air forces 	<ul style="list-style-type: none"> - two man inspection teams were able to inventory aircraft better than one man teams - free access improved inventory accuracy for tactical aircraft
4. FT-4 'Inspection of Retained Levels of Ground Forces'	1964	<ul style="list-style-type: none"> - to test techniques of intermittent inspection for verifying compliance with limitations on deployment of ground forces 	<ul style="list-style-type: none"> - larger teams (five-man) were more accurate than smaller teams - evasive concealment of small mortars and recoilless rifles was very successful

CHAPTER C

SELECTIVE ON-SITE INSPECTION

Selective on-site inspection involves a greater degree of restriction with regard to rights of access than is the case for general on-site inspection. Most frequently such restriction takes the form of permitting entry by inspectors only for the limited purpose of monitoring compliance with agreements concerning specific weapons systems and related facilities. From this central restriction flows certain others. First, access may be allowed only to a particular geographic location, for example, the site of a PNE as under the PNE Treaty, or the site of a facility for the destruction of CWs as in a number of proposals. Second, limitations may be placed on the activities which the inspectors may undertake at the place of inspection and on the information which they may acquire there. For example, inspectors may not be permitted to analyze the nature of a chemical agent which is in the process of being destroyed, for fear that sensitive information may be disclosed. Third, inspectors may also be limited as to the persons they may contact and the questions they may ask them.

In contrast to general on-site inspection systems, selective inspection reduces the degree of intrusion involved as well as costs and personnel requirements. It is also obvious from the foregoing discussion that the distinction between selective and general on-site inspection is more one of degree than of kind. There will clearly be a boundary area between the two categories where the distinction becomes blurred.

An important feature of the method is that it requires arms control agreements not only to precisely define the weapons and materials to be controlled, but also to specify rules acceptable to those countries likely to be inspected which will as far as possible enable the inspectors to check the controlled items but nothing else.

In principle this approach is applicable to virtually all forms of arms control short of general disarmament. Moreover, since the views of the many countries on what constitutes appropriate restrictions on inspection for their respective political systems and military deployments may not coincide, there has been an opportunity for others to put forward verification proposals in the hope of finding a suitable compromise. These reasons may account for the large number of proposals included in this Chapter.

Two special cases of selective inspection are worthy of separate mention. The first is "verification by challenge". This in effect limits inspection to those situations where a party to the agreement has grounds for suspecting another participating country of evading the agreement, and challenges that country to prove its compliance. The expectation is that the accused country in order to prove its innocence would invite an investigation, which it could confine to matters relevant to the point at issue. The advantage of this approach is that an agreement may be reached without having to lay down rigid rules for inspection in advance and different compromises may be arrived at for the verification of each incident. However, it is unlikely that such compromises will be

satisfactory to all signatories. The basic philosophy is set out in proposal C10(A76), but the idea is present in many of the other proposals.

The term "challenge inspection" has emerged recently. The concept underlying challenge inspection appears to be somewhat different from "verification by challenge". In the former a party suspecting a violation has the right to demand an inspection which the suspected party is, in most proposals, obliged to accept. Thus, the core difference between the two approaches is that "challenge verification" involves obligatory inspections while "verification by challenge" involves acceptance of inspection on a voluntary basis.

The second case is IAEA safeguards. The safeguards system uses selective on-site inspection in combination with other verification methods to verify nuclear materials accountancy for nuclear non-proliferation agreements and other arms control agreements. Proposals which discuss IAEA safeguards as the primary verification method have been located separately in Chapter D.

C1(A58)

C1(A58)

Proposal Abstract C1(A58)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

On-site inspection - selective

3. **Source:**

Derman, Cyrus and Morton Klein. "On the Feasibility of Using a Multiple Linear Regression Model for Verifying a Declared Inventory". In Inspection for Disarmament, pp. 220-224. Edited by Seymour Melman. New York: Columbia University Press, 1958.

4. **Summary:**

This paper reports the results of an experiment which attempted to estimate past production of a plant on the basis of an analysis of current relations between several inputs and output. If this could be done accurately then the past (estimated) output of a plant could be used as a check on the accuracy of a declared inventory.

On the basis of 13 weeks observations at a manufacturing plant, the results using a multiple linear regression model indicated that the approach was inadequate for verifying the accuracy of declarations. At best, a different and probably more extensive analysis of the current production system is required. Given even a small error factor, if systematic caching of output was practiced continually (including during the period of observation) then the model would not be effective.

C2(A58)

C2(A58)

Proposal Abstract C2(A58)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Remote sensors - aerial
 - acoustic
- (c) Seismic sensors
- (d) Records monitoring - economic
- (e) Non-physical/psychological inspection
- (f) International control organization

3. **Source:**

Henkin, Louis. Arms Control and Inspection in American Law. New York: Columbia University Press, 1958.

4. **Summary:**

This study examines the legal implications of any future arms control agreement and inspection which might be implemented in the United States. Henkin concludes that "Arms control...would not present a daunting challenge for American Law" (p. 156). New legislation to establish a system of regulation would have a precedent in existing laws and provisions for regulated industries. The inspection body would consist of foreign nationals responsible to an international body (or a foreign government) or of United States officials accompanied by foreign nationals, therefore inspectors would have to be granted privileges, immunities and facilities of a diplomatic character. Legislation should protect individuals and industries from damage or loss as a result of abuse of the inspection process. Federal, state and local cooperation would be necessary, but state rights would not be affected. The most noticeable impact would be on national psychology; it would take time to get used to openness and cooperation which replace elements of secrecy.

An inspectorate would have access to military, industrial, governmental and private installations. Inspection could use any known method including aerial observation and photography, acoustic, seismic and other devices and physical entry into various installations. The inspectors would also be able to request information from government officials, corporations or individuals and examine books, records, and relevant documents and data.

Chapter 1 reviews arms control negotiations in the postwar period and considers American disarmament policy in the future. Chapter 2 postulates the requirements for implementing an arms control agreement including inspection. In Chapter 3, constitutional provisions and their relation to arms control are considered. Chapter 4 explores the

various legal implications of an inspection system involving direct inspection and interrogation and the constitutional limitations on inspection. Congressional implementation of arms control and consequent legislation are covered in Chapter 5. Chapter 6 looks at state laws and local cooperation and Chapter 7 addresses the implications of administrative regulation by an international agency. Chapter 8 discusses the jurisdiction of international tribunals in the realm of arms control.

C3(A58)

C3(A58)

Proposal Abstract C3(A58)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
On-site inspection - selective
 - sampling
3. **Source:**
Solomon, Herbert. "The Use of Sampling in Disarmament Inspection".
In Inspection for Disarmament, pp. 225-230. Edited by Seymour
Melman. New York: Columbia University Press, 1958.
4. **Summary:**
In many disarmament situations, to inspect all factories,
laboratories or government records would involve large numbers of
staff and high costs. Moreover, it may be impossible to recruit
enough trained personnel. One way of reducing the number of personnel
needed and the costs is through sampling. This paper attempts to
assess some sampling designs for inspection purposes. Two inspection
targets are used for illustrative purposes: metal-working plants and
biological laboratories.
By dividing the inspection targets into groups of high, moderate
and low chances of evasion and by applying stratified sampling theory,
the author derives tables relating costs to optimum sample sizes for
the three groups. When evasion is practiced in some plants but not
others there will be a risk of not detecting the evasion. This can be
reduced by increasing the sample size.

C4(A61)

C4(A61)

Proposal Abstract C4(A61)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - selective
- non-obligatory

3. Source:

Schelling, T.C., and M.H. Halperin. Strategy and Arms Control. New York: Twentieth Century Fund, 1961.

4. Summary:

This proposal assumes that each party to an arms control agreement complies with the provisions of the agreement and wishes the other parties to know that it is complying. On this basis, each country would be motivated to provide sufficient evidence of its compliance, not just to submit to agreed examination.

The authors suggest that it would be the responsibility of each country to demonstrate compliance in any way it can, by inviting examination and extending such facilities as would leave no reasonable doubt as to its fulfillment of its obligations.

C5(A62)

C5(A62)

Proposal Abstract C5(A62)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
- (b) Remote sensors
- (c) Short-range sensors - monitoring devices
- (d) International control organization

3. Source:

Finkelstein, Lawrence S. "The Uses of Reciprocal Inspection". In Disarmament: Its Politics and Economics, pp. 82-98. Edited by Seymour Melman. Boston: The American Academy of Arts and Sciences, 1962.

4. Summary:

The author compares the merits of reciprocal inspection on a bilateral basis with inspection conducted by a multilateral, international organization. He concludes that reciprocal inspection offers more advantages than multilateral inspection for verifying certain arms agreements. Reciprocal inspection can consist of "national means" of inspection, which do not require negotiated rights of access, or of mutual rights of access for inspection purposes, including the stationing of monitoring devices, sea or air patrols and physical inspection by visiting teams.

Reciprocal inspection possesses the following advantages. First, it is less prone to obstruction from within the system than is multilateral inspection. Governments can impede the operation of a multilateral system by withholding funds or by infiltrating agents into the international staff. Personnel employed on national staffs for reciprocal inspection could be expected to be more loyal and reliable. Second, under reciprocal inspection, potential violators may be more cautious because of uncertainty about the limits of the system. Third, technological improvements can be introduced more easily into a reciprocal regime than into a multilateral system. Fourth, access to information is easier in the reciprocal system. In this system, all information is deemed relevant whereas in a multilateral system, only specific types of information are gathered and reported to the international forum. Fifth, reciprocal inspection will be deemed to be more reliable, therefore national judgments will be facilitated. This makes a national response easier, because reliance on third-party judgments is avoided and delays in collective decision-making are circumvented. Bilateral arrangements may also give more flexibility to responses by allowing private negotiation of a mutually satisfactory solution instead of the public pressure for conciliation which is generated in a multilateral forum.

There are, however, drawbacks to the reciprocal inspection system. First, the selection of the system in itself does not necessarily promote adoption of an arms agreement. Sufficient political will is a necessary ingredient. States may prefer the less efficient multilateral system and this may become a factor which promotes progress in negotiations. On the other hand, the fact that there may be fewer details to negotiate in a bilateral regime may accelerate negotiations. Second, a reciprocal arrangement is more applicable to bilateral agreements even though agreements such as the Antarctic Treaty (see abstract B7(T59)) allow for the possibility of a form of reciprocal inspection. Even when the parties are arranged in sides, a large number of parties, such as in the cases of NATO and the Warsaw Pact, decreases the usefulness of reciprocal inspection. Third, reciprocal inspection is also more useful when it requires minimal intrusiveness. Sampling of forces stationed in camps or of weapons stored in depots may be useful for verifying certain agreements. Fourth, reciprocal inspection may involve a greater total cost than an impartial inspection system. This would arise because of the duplication of national systems. Lastly, reciprocal inspection may forego the advantages of utilizing existing multilateral machinery. Parties may thereby miss an opportunity to develop institutions which promote a peaceful international order.

C6(A65)

C6(A65)

Proposal Abstract C6(A65)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

The Application of Statistical Methodology to Arms Control and Disarmament: Final Report. Report submitted to United States Arms Control and Disarmament Agency. Princeton, New Jersey: Mathematica, September 1965.

4. Summary:

The aim of the research reported in this work is the identification and exploration of potential applications of statistical methodology to arms control and disarmament. Ten papers form the bulk of the report:

- (1) "Principles of Sampling as Applied to a Disarmament Agreement". Enumerates arms control and disarmament proposals which lend themselves to sampling techniques and discusses problems which may arise. Several techniques to ameliorate some of these problems are presented including hierarchical, cluster and stratified sampling.
- (2) "Statistical Methods in Arms Control: Some General Considerations". Surveys potential uses of statistical techniques in surveillance and the enforcement of a disarmament treaty, specifically concerning the collection of data, the evaluation of data and the design of stabilization measures.
- (3) "A Multistage Inspection System for a Disarmament Treaty". Outlines an inspection system which minimizes the amount of intrusion while maintaining an acceptable level of security. The central idea is to allow the inspected party to control the amount of inspection beyond some specified minimum.
- (4) "Record Consistency as a Criterion of Compliance with an Arms Control Agreement". Explores the key concept of any records inspection verification system, namely the consistency of records.
- (5) "Description of Record and Material Flow in a Simple Factory". Discusses verification in the context of a simplified production process.
- (6) "On Evaluating Inspection Plans for Policing a Disarmament Treaty"
- (7) "Some Extensions of the Theory of Recursive Inspection Games". Both this paper and the former one (6) present new models for the allocation of effort in an inspection system with a limited quota of inspection.

- (8) "Toward an Adequate Disarmament Game". Deals with the methodological problems encountered in the use of gaming models for the design and operation of an arms control verification apparatus.
- (9) "The Inspector's Non-Constant-Sum Game: Its Dependence on One Detector". Constructs and analyzes a model which might be used to enforce a test-ban treaty.
- (10) "The Inspector's Non-Constant-Sum Game: Its Dependence on a System of Detectors". Considers a model involving a set of detectors instead of one.

C7(A67)

C7(A67)

Proposal Abstract C7(A67)

1. **Arms Control Problem:**

Any arms control agreement

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Remote sensors - aerial
- (c) Non-physical/psychological inspection

3. **Source:**

Berman, Harold J. and Peter B. Maggs. Disarmament Inspection Under Soviet Law. Dobbs Ferry, New York: Oceana Publications, 1967.

4. **Summary:**

This book considers two questions: (1) How could the effectiveness and safety of an international inspectorate be provided for under Soviet law, and (2) what limitations upon the powers of an international inspectorate would be necessary to protect the legal rights and interests of Soviet citizens and the Soviet state? The authors conclude that, beyond the issue of the willingness of Soviet leaders to accept an on-site or aerial inspection system for disarmament, there are legal obstacles posed by the Soviet system. However, the Soviet legal system is sufficiently flexible to permit the many particular changes which would be necessary to permit effective operation of an international inspectorate. Furthermore, these changes would create "political pressures for continued obedience to an inspection arrangement" (p. 47).

The book covers: (1) aspects of Soviet law relevant to inspection (Chapter 1); (2) privileges and immunities granted by Soviet law to international organizations, foreign states, their agencies and diplomats and to aliens and stateless persons (Chapter 2); (3) specific privileges and immunities required by an international inspectorate which would necessitate changes in Soviet law (Chapter 2); and (4) legal problems connected with the functioning of the inspectorate such as interrogation of Soviet officials, investigation of private property, interrogation of private Soviet citizens and granting immunity to informers (chapter 3).

The book reproduces the text of relevant provisions of the Soviet constitution, the rules of the Communist Party of the Soviet Union, a statute on the Committee of Party-State Control, the Soviet criminal code, the code of civil procedure and other relevant documents.

C8(A68)

C8(A68)

Proposal Abstract C8(A68)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

Feld, B.T. "Problems of Inspection and Control of Disarmament Agreements" (a Pugwash lecture, August 1968). In A Voice Crying in the Wilderness: Essays on the Problems of Science and World Affairs By Bernard T. Feld, pp. 100-111. Oxford: Pergamon Press, 1979

4. Summary:

According to Feld it is not generally recognized how effective random sampling can be for detecting violations even if the sampling has a relatively small a priori probability of detection, provided the randomness of the sample can be assured.

In an example of 200 missile sites randomly distributed over an area with inspections of five randomly selected sites permitted and with a probability of uncovering a given missile in a given site only 50%, the chance of a violation not being detected is 3%.

Random sampling is therefore an exceedingly effective means of detecting violations. However the achievement of randomness, especially in a situation in which the inspected party is intent upon hiding its violations, is by no means a negligible problem.

C9(A72)

C9(A72)

Proposal Abstract C9(A72)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) On-site inspection - selective
- (b) Short-range sensors
- (c) Remote sensors - aerial
 - satellite
- (d) Non-physical/psychological inspection
- (e) Records monitoring - economic

3. Source:

Zile, Z.L., R. Sharlet and J.C. Love. The Soviet Legal System and Arms Inspection: A Case Study in Policy Implementation. New York: Praeger Publishers, 1972.

4. Summary:

This study examines the legal and non-legal constraints on implementing an arms inspection policy in the USSR. The authors conclude that the "primary obstacle to the conclusion of an arms control agreement would probably be the Soviet leadership's reluctance to permit foreign inspectors to operate on Soviet territory" (p. 308). This would result from the Soviet state's penchant for secrecy. For an inspection policy to be implemented, the initiative would have to come from the Communist Party. Obstacles to effective implementation could be raised by the highly centralized Soviet bureaucracy. The authors recommend the creation of a single Soviet agency to act as the host for an inspectorate if an inspection agreement is ever negotiated.

Topics covered in the book include:

- (1) The Soviet Communist Party and the policy-making process as potential facilitators or obstructors of arms inspection (Chapter 1),
- (2) Constitutional and legal aspects of arms inspection in the Soviet Union (Chapter 2),
- (3) The political cultures of the USSR and their influence on arms inspection (Chapters 1 and 2),
- (4) Soviet attitudes toward foreign nationals and non-Soviet legal entities (Chapters 4 and 5),
- (5) Logistics of an inspection system, including travel within the Soviet Union and access to facilities (Chapters 6-8), and
- (6) Legal problems relating to the functioning of an arms inspectorate concerning intrusiveness, surveillance, interrogation and obtaining documents and evidence (Chapters 12-16). The problems of combating false testimony and protecting cooperative Soviet citizens are considered in Chapter 16.

C10(A76)

C10(A76)

Proposal Abstract C10(A76)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - selective
- challenge

3. Source:

Myrdal, A. The Game of Disarmament. New York: Pantheon, 1976.

4. Summary:

This proposal, often termed "verification-by-challenge" is based on the interest a country which is under suspicion of violating an arms control agreement has in freeing itself of suspicion "through the supply of relevant information, not excluding an invitation to inspection by an outside party or organ." Invitations to inspect would be forthcoming spontaneously in some instances and under pressure in more severe cases of doubt. Should such a challenge go unheeded on several occasions, other parties to the treaty would acquire the right to withdraw from it.

The threat of withdrawal might induce the accused party to offer clarification of the suspected event, or if the suspicion persisted, to invite inspection. The system of "verification-by-challenge" would be useful whether or not obligatory inspection were envisaged, in the treaty. "If obligatory inspection were envisaged, verification-by-challenge would help reduce the size of the unresolved problem and, if inspection were not envisaged, it would help resolve suspicions" (p. 301).

C11(A83)

C11(A83)

Proposal Abstract C11(A83)

1. **Arms Control Problem:**
Any arms control agreement
2. **Verification Type:**
 - (a) On-site inspection - selective
- IAEA safeguards
 - (b) Remote sensors
 - (c) Short-range sensors
3. **Source:**
Pieragostini, Karl. "Cooperative Verification". Arms Control Today 7,
no. 5 (June 1983).

4. Summary:

It is commonly believed that any choice in the means of verification lies solely between the options of national technical means of verification and a highly intrusive form of on-site inspection. The author seeks to refute this assumption, asserting instead that there is a wide range of options available. He enumerates a number of cooperative measures which might enhance the effectiveness of national technical means, including the use of "black box" sensors, advance notification of activities which may be verified later using national technical means, and international safeguards as administered by the International Atomic Energy Agency.

It is also noted that on-site inspection need not be highly intrusive in all instances. Furthermore, the Soviet Union and United States have agreed in principle to on-site inspection under some circumstances. The author concludes that the current lack of any on-site inspection does not preclude progress in arms control, since other cooperative measures provide an alternate form of effective verification.

C12(A83)

C12(A83)

Proposal Abstract C12(A83)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

On-site inspection - selective

3. Source:

Salem, David. "Chinese Domestic Legal Development and Its Implications on Arms Control". Asian Affairs: An American Review 10, no. 2, (Summer 1983): 45-69.

4. Summary:

This article deals with the necessity of some form of on-site inspection to provide adequate verification of an arms control treaty between the People's Republic of China (PRC) and the US. The central concern is with potential obstacles to verification measures that might arise given the PRC's complex legal system and its stringent secrecy laws.

The implications of this legal system for intrusive verification provisions are considered with the search for "clues as to which laws can potentially support or frustrate Chinese participation in the disarmament process" (p. 48). Some of the difficulties which might arise are then discussed. These are: the possibility that inspectors would be subject to criminal sanctions in the performance of their duties; uncertainty as to an inspector's status within the "hierarchical complexities of diplomatic arrangements"; and "perhaps most significant is an appreciation of the role of the Chinese Communist Party in the establishment and execution of Chinese jurisprudential standards" (p. 49).

The degree to which the PRC legislature will facilitate this on-site inspection is largely unknown. Existing regulations are rarely available to the public, and most of the legal codes are so recent that there is little judicial experience to illuminate their application. Finally, it is indicated that Chinese legislation is too 'voluminous' to be understood in its entirety.

A second potential obstacle to intrusive verification measures is the existence of stringent secrecy laws in the PRC. They "probably cover almost all items" pertaining to military inspections, and the greatest challenge facing inspectors will be the circumvention of these laws. To give an idea of their scope, it is noted that "documents pertaining to any important meeting may not be duplicated..., individuals are not permitted to take notes during meetings..., and media services may not publicize or broadcast information touching on state secrets" (p. 54). The pervasiveness of this 'secrecy syndrome' is such that there are numerous public and

civilian security forces. These forces may frustrate inspection operations if the PRC is not truly committed to verifiable arms control. It is concluded that inspectors should strive to keep abreast of Chinese legal developments and legislation where possible, and that, rather than seeking to change existing laws, negotiators should seek to circumvent them; "the best approach is to address the problem in light of existing circumstances" (p.59).

Some recommendations are made on this basis. Inspectors should be granted certain privileges in conducting their investigations, and they should also be granted immunity where security laws may be breached in the course of duty. This would permit some measure of freedom without giving the inspector license to break any laws 'in a routine fashion'. The creation of legislation enabling such inspection is not enough in itself, and secrecy laws must be revised to allow inspectors access to pertinent data.

C13(A84)

C13(A84)

Proposal Abstract C13(A84)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors - satellite
- (c) Seismic sensors
- (d) Verification - general

3. Source:

Cleminson, F.R. and E. Gilman. "Proposals and Technology for Arms Control Verification - A Survey". In Quantitative Assessment in Arms Control, pp. 359-381. Edited by R. Avenhaus and R.K. Huber. New York: Plenum Press, 1984.

See also: Idem. A Conceptual Working Paper on Arms Control Verification. Ottawa: Department of External Affairs, 1986.

4. Summary:

This article is based on a conceptual paper developed from quantification studies of the two editions of the Compendium of Arms Control Verification Proposals. The conceptual paper was originally tabled in the Committee on Disarmament as CD/183 (11 June 1981). The authors present a survey of verification regimes and technologies and conclude that, while national technical means will continue to play a major role in the verification of arms control agreements, there is a need to go beyond national technical means of verification to more intrusive verification including on-site inspection in some areas. This necessity has arisen because of advances in weapons technology.

The authors define verification and categorize verification regimes. Levels of verification range from absolute verification under which no doubt remains about treaty compliance, to no verification at all (see Table 1). The authors survey verification methods using the categories developed in the reference matrix of the second edition of the Compendium. They suggest that advances in technology must be harnessed in order to develop the capabilities of national technical means of verification. Satellite reconnaissance and surveillance platforms, electronic intelligence collection systems and seismic detection methods are examples of recent advances in "high" technology for verification.

While the superpowers have traditionally relied on national technical means for verification of arms control agreements, in part for reasons of strategic security, changes in technology and political attitudes may lead to acceptance of on-site inspection for verification. A number of functional international verification organizations already exist, so there is no problem in translating the

concept of international verification into reality. The International Atomic Energy Agency, United Nations observer missions and the Agency for the Control of Armaments of the Western Europe Union are examples of successful international verification organizations. Cost factors and skilled manpower requirements will influence any assessment of an international verification system. The authors note that the Soviet Union has expressed a willingness to discuss intrusive means of verification including on-site inspection.

Table 1: Verification Categorization*

<u>Regimes</u>	<u>Methods</u>	<u>Systems</u>
Absolute Verification	General on-site inspection	Photo Reconnaissance Satellite
Adequate Verification	Selective on-site inspection	"Ferret" Satellite
Limited Verification	Challenge on-site inspection	Nuclear Radiation Detection Satellite
Token Verification	Control Posts/Observers/ Liaison Missions	Spacecraft Laboratory
No Verification	Remote Sensing in-situ	Seismic Sensors
	Remote Sensing-National Technical Means	Control Posts
	Complaints/Consultation	Remote Sensing Posts
	Collateral Analysis	Peacekeeping/Observer Missions
		Literature Survey
		International Information Exchange
		Etcetera Etcetera

* Source: Idem. A Conceptual Working Paper on Arms Control Verification.
Ottawa: Department of External Affairs, 1986, p. 12.

C14(A84)

C14(A84)

Proposal Abstract C14(A84)

1. Arms Control Problem:

Any arms control agreement

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors

3. Source:

Shearer, Richard L. On-Site Inspection for Arms Control: Breaking the Verification Barrier. National Security Affairs Monograph Series 84-7. Washington D.C.: National Defense University, 1984.

4. Summary:

A comprehensive scheme for on-site inspection is described in this paper. The author begins with a consideration of the more general aspects of verification, the problems that have been encountered to date, its purpose and prospects. Much attention is also given to the theoretical underpinnings of the argument for on-site inspection, and a thorough verification proposal is methodically constructed on this basis.

The first issue addressed in this paper is the lack of progress in arms control to date and the significant obstacles posed by verification. This failure essentially stems from the fact that adversaries "do not willingly lay down or reduce their arms when facing an adversary they fear or distrust" (p.6). Arms control has been hindered by the tendency to react on the basis of possible outcomes given incomplete information and reliance on a worst case analysis of the situation. Organizational interests, bureaucratic obstacles to innovation and cultural and technological differences have led the Soviets to preserve their secrecy while the US seeks to preserve its advantages. Finally, both sides are simply unwilling to accept the rough parity that is required for successful arms control.

To some extent, the superpowers have circumvented these problems through their almost total reliance on national technical means of verification and the use of cooperative measures and counting rules. The author contends that this reliance has prevented any meaningful arms control however, since agreement has been restricted to that which can be verified by national technical means. Furthermore, counting rules may actually exacerbate the situation as nations will attempt to maximize their power within "legal" limits by MIRVing all weapons that are to be counted as such. It is suggested that on-site inspection has been ignored as a potential solution, and that, in fact, the future of arms control rests on the ultimate acceptance of on-site inspection as a legitimate form of verification.

Following this, the underlying principles and rationale for verification are discussed in order to establish its centrality. Some points worth mentioning pertain to the utility of increasingly intrusive verification measures as a means of enabling future progress in more ambitious arms control and verification. The criteria for judging the adequacy of verification are also enumerated: one ought to consider the other party's intentions, his opportunities, risks, timing, and possible advantages which might accrue from violations. The level of stringency to be met will vary according to the nature and extensiveness of any agreement. More drastic reductions will demand much better verification procedures, as any violations would become relatively more important where there are fewer weapons in existence. Finally, it is noted that as arms control progresses, agreements will have to encompass more elusive weapons systems such as chemical and biological warfare and MIRVed missiles, so that on-site inspection will become increasingly central.

The strategy which is envisaged for the promotion of on-site inspection is a general one insofar as no actual provisions for conducting inspections are specified. A gradual approach is proposed wherein the US might seek to create a more favourable environment for the eventual acceptance of on-site inspection. To begin with, the United States should clearly state its objective of promoting on-site inspection, and should act unilaterally "to set precedents for on-site inspection and to put pressure on the Soviets" (p.43). They could ratify the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty as a positive way of demonstrating their intent and adding weight to their position. The US might also bring pressure to bear on the Soviets by stressing the mutual benefits of on-site inspection and unilaterally providing information themselves, then requesting reciprocity. This might serve to provide incentive while simultaneously invoking the pressure from the world community.

The second step in this strategy seeks to establish "negotiated provisions that are not directly intrusive" (p. 51). Such provisions might call upon each side to establish verification procedures for every new weapons system that it introduces; this would not compel nations to adopt on-site inspection, but it would make it a preferable alternative in many instances, since other methods would be more costly, time consuming or impossible. This is dubbed the "substitution principle" which "wouldn't force either side to accept on-site inspection ... but if they wanted to comply without sacrificing secrecy, they would have to forego an opportunity to save money, increase their power and deploy their missiles in a more stable manner" (p. 56).

The third and final step of this strategy provides for the actual use of on-site inspection, or "negotiated provisions that require increased intrusiveness" (p. 57). No specific provisions are outlined here since they will depend on circumstances and a number of factors which are as yet unknown. In conclusion, it is noted that this strategy for on-site inspection, at the very least, will give the US a "propaganda advantage" (p. 58), and under the best conditions would actually allow for the acceptance of on-site inspection while improving the strength, stability and survivability of US forces.

C15(A85)

C15(A85)

Proposal Abstract C15(A85)

1. Arms Control Problem:

- (a) Any arms control agreement
- (b) Nuclear weapons - ballistic missiles
- (c) Conventional weapons - ground forces
- (d) Regional arms control - Europe

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors - aerial
- (c) International exchange of information
- (d) International control organization

3. Source:

Buhl, Hartmut. "Verification: Primarily a Political Problem". In A Proxy for Trust: Views on the Verification Issue in Arms Control and Disarmament Negotiations, pp. 55-64. Edited by John O'Manique. Ottawa: The Norman Paterson School of International Affairs, April, 1985.

4. Summary:

Particular attention is given in this essay to the definition of verification and the nature and scope of its task. National security is denoted as one of the fundamental principles of verification, and paradoxically, can only be enhanced by a country's openness to verification and the exchange of information. Verification is also distinguished from monitoring, as the latter is the 'hard search for facts', whereas verification is a political act which seeks only to ascertain compliance with a particular agreement - it is 'intrinsically subjective and idiosyncratic', and cannot necessarily establish the truth. Consequently, the level of verification will depend on the agreement to be verified, and while the concept of verification itself should be a universal and objective one, it should be flexibly negotiated and interpreted in its application.

The actual requirements of verification under various circumstance are also discussed. Traditionally, Moscow's attitude towards verification has been negative, but it is becoming increasingly open. This is important given that more intrusive forms of verification such as on-site inspection are indispensable to the verification process. Conversely, the US tends to over emphasize more intrusive verification measures to the exclusion of lower levels of verification which may also be useful, such as the exchange of data.

Various types of arms control also have different implications for the arms control process and the role of NATO allies. The strategic nuclear field is of less interest to European allies, but

they should be directly involved in negotiations over intermediate-range nuclear forces (INF). Proposals for the nature of this involvement are offered - that European states should participate indirectly in negotiations, maintain constant, close consultation, and conclude a separate agreement on verification measures with the relevant negotiating party. With regard to conventional weapons, it is concluded that on-site ground inspection must be the central element of verification for Mutual Balanced Force Reductions (MBFR), while airborne inspections are less useful.

Finally, a strong case is made for cooperative measures of verification which would permit evidence to be tendered, increase public pressure for compliance, and negotiate the requirements for on-site inspection. The European role is specified as one of ensuring that all parties are subject to the same requirements. The possibility also exists that European nations may develop their own separate monitoring capability.

Some general principles are outlined with regard to verification on the basis of this discussion. First, verification should be equally binding on all sides in order to contribute to confidence-building, and no party should gain a unilateral advantage from verification measures. Verification arrangements should also be attuned to the nature of the agreement itself, and must take account of other states' interests and sovereign rights. On-site inspection and information exchange are necessary components of verification along with national technical means, and these means and methods of verification should allow all parties equal access to relevant information. Finally, it is suggested that an internationally staffed verification system be developed to administer the verification process.

C16(A62)

C16(A62)

Proposal Abstract C16(A62)

1. **Arms Control Problem:**

General and complete disarmament

2. **Verification Type:**

On-site inspection - selective

3. **Source:**

Etzioni, A. The Hard Way to Peace: A New Strategy. New York: Collier, 1962.

4. **Summary:**

This proposal seeks a solution to the problem of intrusiveness in dealing with armament reductions. it is suggested that weapons to be destroyed should be moved under international supervision to a place outside the boundaries of the nation to whom they belong and destroyed there under international supervision.

As the process of disarmament proceeds, and confidence increases, it might be possible to transfer, under strict controls, certain weapons (i.e ships, planes, radars) to neutral states where they could be converted for peaceful purposes. In any case, whether the weapon system is to be converted or destroyed, free inspection of it would be permitted at the destruction site so as to diminish the value of the weapon to its original developer.

C17(A62)

C17(A62)

Proposal Abstract C17(A62)

1. Arms Control Problem:

General and complete disarmament

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
 - progressive/zonal
- (b) Non-physical/psychological inspection
- (c) Records monitoring - economic
- (d) Short-range sensors
- (e) International control organization

3. Source:

Rodberg, Leonard S. "The Rationale of Inspection". In Disarmament: Its Politics and Economics, pp. 68-81. Edited by Seymour Melman. Boston: The American Academy of Arts and Sciences, 1962.

4. Summary:

In this explanation of the rationale for inspection, the author notes that inspection provides reassuring information and acts as a deterrent. While absolute precision in verification is not possible, "Initial estimates of the capabilities of inspection systems have suggested that a sufficient degree of assurance can be provided during the early stages by an inspection system which is both technically and economically feasible" (p. 72). Rodberg considers inspection for verifying a gradual but general reduction of forces to very low levels. Such an inspection system would control the dismantling and demobilization of forces and would allow "limited access to verify with reasonable accuracy" (p. 72) the existing force levels.

With reductions in force levels, the presence of clandestine forces increases in significance, therefore the degree of inspection should increase with the degree of disarmament. The problem of reluctance to disclose force levels prior to the beginning of inspection can be overcome by using zonal inspection of successive geographic areas within each participating state, by introducing warning systems and by destruction of limited amounts of arms prior to the beginning of inspection as a sign of good faith. The use of overlapping inspection techniques can improve the effectiveness of verification. This may involve physical inspection of forces, inspection of industrial production, "knowledge detection" (motivating individuals who learn of prohibited activities to report them) and budgetary control. Sampling may reduce the degree of access to information and thereby allay fears of espionage.

An ideal inspection system would use automatic, unmanned detectors and a computer capable of analyzing data to show merely whether a violation had been detected or not. Sensitive information

would thus not be released and intrusiveness would be minimized. In practice, however, such a system is not possible because of ambiguous data which Rodberg advocates the establishment of an international inspectorate "in order to assure permanency, impartiality and continuity despite changes in national alignments" (p. 80), but the composition of the inspectorate may allow a nation to interfere with the inspection process or a nation may lack confidence in the system when it is operating in another country. Reciprocal inspection on a bilateral basis may be a good beginning to developing an inspection system, but it could lead to charges of espionage or could institutionalize an adversarial relationship.

C18(A64)

Proposal Abstract C18(A64)

- 1. Arms Control Problem:**
 - (a) General and complete disarmament
 - (b) Nuclear weapons - comprehensive test ban
- 2. Verification Type:**
 - (a) On-site inspection - selective
 - control posts
 - (b) Remote sensors
 - (c) Seismic sensors
 - (d) International control organization
- 3. Source:**

Wright, Michael. Disarm and Verify. London: Chatto and Windus, 1964.

4. Summary:

In part one of this book, the author reviews the course of post-war disarmament negotiations and emphasizes the need for disarmament. Verification of a disarmament agreement or a comprehensive test ban is a difficult issue to resolve. In part two, he examines the tasks and requirements for effective international verification. Part three looks at the Soviet, American and British approaches to disarmament and verification and considers the role of the scientist in arms control.

Verification of a comprehensive test ban can be accomplished with the use of remote sensors, but monitoring complete disarmament requires on-site observers. There are four tasks for on-site inspectors: (1) verifying the actual destruction of any weapons specified in an agreement; (2) verifying that, once weapons are destroyed, they are not replaced by new weapons; (3) verifying the reduction of force levels; and (4) confirming that weapons are not illicitly concealed. To perform these verification tasks, inspectors would have to be granted considerable freedom of movement and rights of access to facilities and personnel. A rough estimate of the number of inspectors and supporting staff required to verify total disarmament in the United Kingdom, United States and Soviet Union is 45,000. A 1958 estimate of the cost of verifying a comprehensive test ban only placed the amount at \$2-3 billion to install and \$500 million annually to run it.

Although there were advances in technology for verifying a comprehensive test ban, by 1962 Western scientists still suggested that about thirty seismic events per year due to shallow earthquakes in the Soviet Union could not be distinguished from nuclear explosions. On-site inspection was not possible after the Soviet Union repudiated its earlier acceptance of the idea in November 1961.

However, agreement between the Western nations and the Soviet Union on verification of nuclear tests in the atmosphere, in space and underwater led to the Limited Test Ban Treaty of August 1963 (see abstract J120(T63)).

Between 1958 and November 1961, there was a wide measure of agreement between the United States and the Soviet Union on the structure of an international verification system to monitor a comprehensive test ban. The system was to consist of a control commission (perhaps with eleven members), a neutral chief administrator and a balance of Soviet and American or British deputy administrators. These officers would be responsible to a conference of all parties to the treaty. Verification would be carried out by control posts and on-site inspection teams. Soviet and American proposals for an international disarmament organization to monitor a treaty on general and complete disarmament contained provisions for a conference of parties, a control council, and staff recruited on an international basis (see abstracts P14(G62) and P15(G62)).

C18.1(A64)

C18.1(A64)

Proposal Abstract C18.1(A64)

1. **Arms Control Problem:**
General and complete disarmament
2. **Verification Type:**
On-site inspection - selective
3. **Source:**
Burns, Richard Dean. "International Arms Inspection Policies Between World Wars, 1919-1934". Historian 31 (August 1969): 583-603.
4. **Summary*:**

Whether or not to have international inspection and supervision of disarmament agreements was a significant question during the inter-war years. The intensity of emphasis on inspection during this period was not so great as after World War II because "the earlier deliberations ordered disarmament issues differently by concentrating first on political security guarantees and technical methods of limiting armaments" (p. 583). However, the basic fear remained the same: "that an aggressive government might ignore its pledge to reduce its military forces, or to keep them within prescribed limits, and treacherously gain dominance over those who had" (p. 583).

The author summarizes his conclusions as follows:

"First, controls were introduced to provide for deterring or detecting any "cheating" which might endanger nations accepting a general disarmament pact and, simultaneously, to reassure anxious signatories that potential adversaries had honored their pledges. Inspection and supervision would provide an institutional substitute for international good faith. Second, this issue became a contentious point during the 1920s because of the fundamental differences among the major Western democracies vis-a-vis the relationship of disarmament and security. For the French, disarmament was anchored to, and dependent upon, security; they claimed that once national security was achieved (through political and technical means), disarmament could follow. Anglo-American attitudes differed markedly: to these nations disarmament would bring increased security, hence special

* Editor's Note: There is an extensive literature on the subjects of verification and compliance during the period between the World Wars. Because of time limitations only a few such articles have been included in this Compendium. While verification technology has advanced since that era, some of the historical insights relating to these issues continue to have relevance today.

concern over control and verification (as well as political guarantees) was really unnecessary. Third, the initial contest over this issue centered on "internationalist" as opposed to "nationalist" approaches to this problem. France held that world-wide inspection and control powers were vital to general disarmament, while the United States and Britain insisted that such programs infringed too greatly on national sovereignty. Fourth, concessions by the Americans, British, Italians, and Germans during 1932-1933 brought about agreement, in principle, on the necessity and desirability of international controls. However, these negotiations came to naught because of the deadlock over Germany's demand for "equality" in armaments and France's persistent search for more "security". Fifth, France consistently escalated its demands for international controls, even as concessions were forthcoming from other nations. This process of escalation resulted in most of the fundamental questions about international arms inspection being introduced long before 1946. Sixth, the negotiatory process which developed the issue of inspection and control during the interwar years suggests concessions were more often inspired by the demands of politics than by abstract principles. Thus a nation's alteration of its policies toward this question seems to have involved less an abandonment of technical or moral inhibitions than a desire to retain or enhance its own relative position in a shifting international power structure" (pp. 583-584).

C19(A66)

Proposal Abstract C19(A66)

1. **Arms Control Problem:**
 - (a) Regional arms control - demilitarization
- Antarctica
 - (b) Nuclear weapons - proliferation
2. **Verification Type:**
 - (a) On-site inspection - selective
- IAEA safeguards
 - (b) International exchange of information
 - (c) International control organization
3. **Source:**

Simsarian, James. "Inspection Experience Under the Antarctic Treaty and the International Atomic Energy Agency". American Journal of International Law 60 (1966): 502-510

4. Summary:

The article reviews two inspection systems which monitor arms control agreements and concludes that they provide an important precedent and practical experience for future arms control agreements. Inspection under the Antarctic Treaty is by national teams. The only prior condition for a party to send an inspection team to the continent is the notification of all other signatories of the Treaty of the names of the inspectors. Inspections of US stations in Antarctica by teams from New Zealand (1963), Australia (1963), the United Kingdom (1963) and Argentina (1965) confirmed that American activities did not violate the Treaty in any way. The Soviet Union stated that it could agree to unlimited inspections in Antarctica "where inspections cannot be used against national security" (p. 509).

An international inspectorate conducts inspections for the IAEA. Agency inspectors conducted inspections of the American Yankee nuclear plant without prior notice in February and April 1965. These unannounced inspections established an important precedent for the application of IAEA safeguards.

C20(A84)

C20(A84)

Proposed Abstract C20(A84)

1. Arms Control Problem:

Regional arms control - Europe

2. Verification Type:

On-site inspection - selective

3. Source:

Blaker, James R. "On-site Inspection: The Military Significance of an Arms Control Proposal". Survival 26, no. 3 (May/June 1984): 98-106.

4. Summary:

The author contends that acceptance by the Warsaw Pact Organization (WPO) at the MBFR talks of Western concepts of on-site inspection "could give NATO a militarily significant instrument to deal with one of the most dangerous problems facing the Western alliance; namely, the increasing capacity of the Warsaw Pact to launch ... a short-warning attack" (p. 98). In this role inspections would be used not for information gathering but for disruptive purposes.

The context in which inspections would be used for this purpose are important; the new doctrine of "Air-land Battle" or extending the battlefield is particularly relevant. This doctrine involves an attempt to redress the advantage possessed by WPO forces in a short-warning attack by attacking WPO forces at an early stage, before they have reached NATO forward defensive lines. This may even mean the use of preemptive military force by NATO.

The author contends that this new Western military interest in preemption has caused increased Soviet attention to on-site inspection. As a result of the new Western interest in preemption the WPO would no longer monopolize the initiative regarding the opening of hostilities. There is, consequently, an increased tendency by the WPO to view the problem of crisis management and stability in similar terms as does NATO. This is true because each side sees a benefit in gathering information about the other's intentions. More information would assist each side in preventing the other from taking the initiative to escalate a crisis.

The author goes on to argue that the West could use inspections to cause the USSR to delay preparations once a decision has been made by the Soviet Union to attack. This result would occur in the following way. If the West gathered initial intelligence suggesting Soviet preparations to attack they might, under an arms control agreement, call for one of a quota of on-site inspections. It would be in the interest of the USSR to grant this inspection since to refuse would reinforce Western intelligence about an impending attack and cause the West to speed-up defensive preparations. In addition,

deceiving the inspectors into believing there were no preparations would undermine Western preliminary intelligence causing the West to delay defensive preparations to the advantage of the attacking WPO forces. Such attempts at deception, however, would also disrupt the WPO's own preparation.

Some data is provided to suggest that this disruptive effect of Western inspections would have direct military utility to the West. Its impact would not be as significant as a preemptive strike but would be politically more acceptable since a war is less likely to be precipitated.

Several objections to this use of inspections as disruptive devices are addressed. The USSR could not use inspections to disrupt Western defensive preparations since there would exist no incentive for the West to try to deceive Eastern inspectors as to Western preparations. Nor would information flowing from Western inspectors about Eastern activities succeed in slowing down Western preparations because reports from the inspectors would not be used in decisions relating to defensive preparations. Finally, use of inspections for disruption would not be a perversion of the concept of verification in arms control.

C21(A84)

C21(A84)

Proposal Abstract C21(A84)

1. Arms Control Problem:

Regional arms control - Europe

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors
- (c) International exchange of information - declarations

3. Source:

Wittekindt R. "Verification of MBFR Agreements - A System Analysis". In Quantitative Assessment in Arms Control, pp. 383-411. Edited by R. Avenhaus and R.K. Huber. New York: Plenum Press, 1984.

4. Summary:

This article presents a system analysis of the practical aspects of a verification regime for a future MBFR agreement. The study was prepared for the government of the Federal Republic of Germany. It makes extensive use of mathematical formulae, equations and graphs. The verification system is designed to give at any time an estimate of the forces (personnel and tanks) which the monitored party keeps within the MBFR area. On-site inspections would be used for counting personnel and tanks and would be supplemented by national technical means of verification. Continual measurement or counting of all transit numbers across the boundary would be carried out and the monitored party would facilitate verification by establishing a limited number of exit-entry points and by providing written declarations containing exact figures about personnel and tanks. The system makes allowance for counting error and a "probability of detection" which is based on an assumed size of violation called the "reference violation". Results of counting would indicate whether the party is conforming with the treaty or is violating it.

C22(A62)

C22(A62)

Proposal Abstract C22(A62)

1. Arms Control Problem:

Regional arms control - nuclear weapons free zones
- Africa
- Near East

2. Verification Type:

(a) On-site inspection - selective
(b) Remote sensors - aerial
(c) International control organization

3. Source:

Frisch, D. "A Proposal for an African and Near Eastern Zone Free from Weapons of Mass Destruction". In Woods Hole Summer Study, Verification and Response in Disarmament Agreements, Annex Volume I, Appendix F, pp. 71-74. Washington, D.C.: Institute for Defense Analysis, November 1962.

4. Summary:

This proposal envisages a verification system that would include the establishment of an international disarmament organization. This organization would:

- (1) inspect cargoes at seaports and airports in the zone and on overland routes into the zone;
- (2) annually make a limited number of other optimal ground inspections and aerial inspections of each large country and each group of small countries.

C23(A63)

C23(A63)

Proposal Abstract C23(A63)

1. **Arms Control Problem:**

Regional arms control - nuclear weapons free zones

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Remote sensors - satellite

3. **Source:**

Wheeler, G.J. "Inspection in a Nuclear Free Zone". In Weapons Management in World Politics: Proceedings of the International Arms Control Symposium December 17-20, 1962, pp. 491-499. Edited by J.D. Singer, Ann Arbor, Michigan: 1963.

4. **Summary:**

This proposal suggests a verification system that could be applied to the establishment of nuclear free zones in regions containing no previous nuclear stockpiles. This, the author maintains, simplifies the matter of verification considerably. There is no need to search for missile launching sites or banned-weapon production facilities, nor is there a stockpile problem since these things are known for certain beforehand. The verification system proposed here would use normal diplomatic and tourist sources of information to monitor compliance with an agreement establishing a nuclear weapons free zone. The author maintains that it is precisely these sources that have allowed us to know that certain regions are free of nuclear weapons and that these sources can continue to offer assurance of compliance with an agreement. "Ambassadors, consuls and their staffs would be aware of suspicious circumstances by the very nature of their duties. Countries generally welcome tourists who travel freely and thus could inspect if they chose" (p. 489). New restrictions, for instance, on travel might lead to suspicion and the government concerned could be questioned as to the reason for the new restrictions. Similarly, large numbers of natives visiting a foreign nuclear power for training in new technologies might raise questions. A large influx of foreign nationals to man new equipment would also be suspicious. The author assumes that even clandestine activities would offer opportunities for detection; for instance, an increase in the number of planes or ships arriving in a country.

An operating inspection system would be called on to investigate suspicious activities. This might include satellite monitoring initially and, if necessary, on-site inspection later on. In this way, a relatively few inspectors would be required to monitor the suggested agreement.

Finally, the author suggests that an agreement among the non-nuclear nations must not preclude uses of atomic energy, but that international safeguards should be applied in such cases.

C24(A77)

C24(A77)

Proposal Abstract C24(A77)

1. **Arms Control Problem:**

Regional arms control - outer space - ASATs

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Remote sensors - satellite

3. **Source:**

Frye, Alton. "Strategic Restraint, Mutual and Assured". Foreign Policy 27 (Summary 1977): 3-24.

4. **Summary:**

In order to supplement provisions in SALT I banning interference with NTMs, Frye suggests a flat prohibition on development and testing of anti-satellite weapons. Close approach by one country's satellite to that of another should be prohibited unless there is prior notification and full description of the approaching satellite's mission and capabilities.

Equally important is a ban on high-energy laser and particle-beam tests in outer space and a ban on large nuclear reactors or other power sources in space capable of generating threatening levels of laser or particle-beam output.

To ensure that satellites conform to the proposed rules, the parties should arrange joint visits to space stations and other man-made objects orbiting the earth, perhaps in the space shuttle. Non-destructive external inspections would be permitted during the joint visits. Where satellites are inaccessible to visits by joint crews, procedures should be drawn up for remote inspection on an agreed schedule by unmanned satellites.

C25(A84)

C25(A84)

Proposal Abstract C25(A84)

1. Arms Control Problem:

Regional arms control - outer space - ASATs

2. Verification Type:

On-site inspection - selective

3. Source:

Smith, Marcia. "Satellite and Missile ASAT Systems and Potential Verification Problems Associated With the Existing Soviet Systems". In Space Weapons: The Arms Control Dilemma, pp. 83-91. Edited by Bhupendra Jasani. London: Taylor and Francis, 1984.

4. Summary:

This paper discusses the problems associated with verifying Soviet ASAT systems. The paper is partially based on Congressional Research Service Issue Brief 81123, "Anti-satellites (killer satellites)" prepared by the author for use by the US Congress. The Soviet Union currently possesses a co-orbital satellite interceptor (SS-9) and may have a direct ascent system using nuclear warheads launched on a Galosh anti-ballistic missile (ABM). The author states that verification of a treaty banning ASAT systems such as the Galosh, the SS-9, lasers and space mines would be extremely difficult and "on-site inspection will almost certainly have to be accepted" (p.90). If even a few SS-9 ASAT interceptors escape verification, the impact on US national security could be severe.

C25.1(G85)

C25.1(G85)

Proposal Abstract C25.1(G85)

1. **Arms Control Problem:**

- (a) Regional arms control - outer space
- (b) Nuclear weapons - anti-ballistic missiles

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) International exchange of information

3. **Source:**

United States. START Proposal of 1 November 1985. (reported in New York Times 2 November 1985).

See also: - CD/PV.349, 20 March 1986.

- CD/PV.338, 11 February 1986.

4. **Summary:**

The US government has proposed that the USSR join it in an "open laboratories" arrangement under which both sides would exchange information on their strategic defence research programmes. Reciprocal opportunities would be provided for experts who would be permitted to visit associated research facilities and laboratories to determine firsthand that the strategic defence programmes in question do not involve offensive weapons.

5. **Selected Comments by States:**

The USSR is reported to have responded that if a ban on offensive weapons in space is agreed, all laboratories would be opened. (Arms Control Reporter (July 1986): 575.B.152).

C26(A61)

C26(A61)

Proposal Abstract C26(A61)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles
- manned aircraft

2. Verification Type:

(a) On-site inspection - selective
(b) Records monitoring - economic

3. Source:

Frisch, D. Arms Reduction: Program and Issues. New York: Twentieth Century Fund, 1961.

4. Summary:

The author begins by noting that missile production is organized in pyramidal fashion, with raw materials at the base and the missile at the top. There is increased specificity of product characteristics the higher up in the process one looks. On this basis, it is clear that inspection becomes more critical at higher stages in the pyramid. At the top, inspection amounts to counting inventories and checking for concealed missiles, while at lower levels, component parts must be accounted for. If the process of development and production seems to suggest that more missiles should exist than are accounted for in the inventory, a violation is indicated.

The author notes that records inspection would involve an excessively large amount of information to be evaluated and that monitoring inventories and production of certain critical components such as jet engines and fuels, airframes, etc. would constitute a more viable approach. Tight controls could be kept over such components.

C27(A61)

C27(A61)

Proposal Abstract C27(A61)

1. **Arms Control Problem:**

Nuclear weapons - ballistic missiles
- manned aircraft

2. **Verification Type:**

(a) On-site inspection - selective
- sampling
(b) Records monitoring - plant

3. **Source:**

Wiesner, J.B. "Inspection for Disarmament". In Arms Control: Issues for the Public, pp. 118-123. Edited by L. Henkin. Englewood Cliffs, New Jersey: Prentice-Hall, 1961.

4. **Summary:**

In seeking to verify an agreement limiting, but not banning nuclear weapons and their delivery systems, this system would be composed largely of a data-gathering force. Components required for production of nuclear armaments would be classified in the following manner:

Type 1 plants: those producing "critical components", difficult to manufacture and easy to identify, such as high-precision gyros and rocket engines;

Type 2 plants: those producing one or more components of aircraft or missiles; and

Type 3 plants: all other manufacturing facilities.

Type 1 plants would require resident inspectors, Type 2 semi-random sample inspection every six months, and Type 3 semi-random sample inspection every year.

A records control centre would establish plant and product classification criteria, assign product code numbers, classify output information, etc. All plants would forward by mail complete copies of production, shipping and receiving records to the records control centre at specified intervals, retaining duplicate copies of such records to be picked up and checked against plant facilities by the field inspectors when they arrive. The field inspectors would periodically forward such duplicate records to the control centre by couriers for checking against the mailed reports.

Sampling techniques would be used extensively throughout the monitoring process.

C28(A62)

C28(A62)

Proposal Abstract C28(A62)

1. Arms Control Problem:

Nuclear weapons - ballistic missiles
- manned bombers

2. Verification Type:

- (a) On-site inspection - selective
- progressive/zonal
- (b) Records monitoring - personnel
- (c) International exchange of information - declarations

3. Source:

Woods Hole Summer Study. Verification and Response in Disarmament Agreements. Annex Volume I. Washington, D.C.: Institute for Defence Analysis: November 1962.

4. Summary:

This proposal deals with the verification system for an agreement reducing by stages over 3 years the number of strategic delivery vehicles possessed by the United States and the Soviet Union. The following components are suggested:

- (1) Initial declarations of total inventories would be required to determine the number of vehicles to be destroyed during each stage. "These declarations could be made implicitly by delivering the vehicles to be destroyed rather than through the explicit deposit of a written document" (p.15).
- (2) Verification might be limited during the three year reduction period to monitoring the destruction of vehicles and to inspection of declared production facilities. Inspectors would establish procedures for verifying the absence of clandestine production and stockpiles. A limited number of inspection teams would begin by inspecting some of the larger cities or industrial centres; both the number of teams and the area covered would be gradually increased during the period of reduction.
- (3) At the end of the three year period, inspection procedures would be established to provide reasonable assurance that the production and deployment of delivery vehicles is held within the agreed limits.
- (4) The inspectorate might be given the right to conduct some hundred (this is apparently an arbitrary figure) inspections per year at selected industrial facilities, as well as continuous monitoring of declared production facilities and activities associated with related peaceful programs. Some pre-emptive inspections without advance notice should be allowed.

- (5) Only limited access to production facilities should be permitted the inspectorate. For instance, visits might consist of tours through selected factories and interviews with plant personnel. No records monitoring, blueprint examination or hardware testing would be allowed. Three man inspection teams are envisaged.
- (6) The inspectorate would fulfill other duties as well. It would conduct selected monitoring of the activities of professional personnel, especially those presently associated with aircraft and missile programs. It would be charged with carrying out sample inspections of retained force levels, with enough access to permit a count of the number of vehicles, without threatening the security of the deterrent force. The status of defensive measures, including air-defence, anti-missile defences and anti-submarine system would be monitored as well.

C29(G62)

C29(G62)

Proposal Abstract C29(G62)

1. **Arms Control Problem:**

Nuclear weapons - ballistic missiles

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Records monitoring - plant
- (c) Remote sensors.

3. **Source:**

United Kingdom. "Preliminary study of problems connected with the elimination of rockets as nuclear delivery vehicles". ENDC/53, 1 August 1962.

4. **Summary:**

To control production of rockets the paper claims that it would be necessary to have resident inspectors at main assembly plants and proving grounds unless space research was internationalized. Also checking the records of principal sub-contractors and periodic visits to component manufacturers could be used. The UK paper suggests that the number of inspectors needed would be in the thousands.

The destruction of production facilities and bases could be verified only by inspection. Mobile launchers would, however, provide greater problems.

Clandestine production given suitable inspection would be less of a danger than clandestine storage of previously produced rockets. Illegal stocks of rockets could be hidden and extremely difficult to detect even with unrestricted inspection.

To ensure against aggressive developments in space, satellites and spacecraft should be subject to inspection at all stages of design and production and control should be exercised at assembly points and launched sites to ensure no illegal payloads were launched. A large number of inspectors would be needed.

- (1) International Atomic Energy Agency safeguards operating under the Nuclear Non-Proliferation Treaty;
- (2) Zonal plans (nuclear-free zones, demilitarized zones and zonal or territorial inspection plans);
- (3) No first use agreements;
- (4) Unilateral initiatives, inviting reciprocity (GRIT), as a supplement to or substitute for negotiated agreements;
- (5) Inspection schemes (other than zonal)
 - (a) highly technological schemes (e.g. satellites)
 - (b) inspection by the people
 - (c) sampling schemes, hide-and-seek simulation games

- (6) Proposals for a new disarmament organization; and
- (7) Historical plans such as the Acheson-Lilienthal scheme or the Baruch Plan.

Many references accompany each section (approximately 480 in total) but not all are abstracted. Sources include magazines, journals, newsletters, books and publications from governments and international organizations. There is no overall summary or conclusion.

In his reply of 28 December, Kennedy accepted the Soviet position regarding provisions to ensure against use of the inspections for espionage purpose so long as inspectors could satisfy themselves that they were actually at the intended location and had the freedom necessary to inspect the limited designated area. Regarding the number of inspections to be permitted each year, Kennedy states the US position to be that 8-10 are needed though he suggests that this could be reduced to a compromise figure if the USSR raises the number it is

willing to accept. Kennedy also expresses concern that the inspections suggested by Khrushchev appear to be limited to seismic areas and not to include the whole of the Soviet Union. Finally, Kennedy does not feel that establishing three automatic stations, while helpful, goes far enough and he suggests other areas of the Soviet Union which would need to be covered.

In his letter of 7 January, Khrushchev states that the three automatic stations can be located wherever the US wishes and that the inspections could be carried out anywhere in the Soviet Union provided that reasonable precautions were taken against espionage. (Note: Meetings of the US and Soviet officials after this exchange of letters failed to produce agreement).

C32(G63)

C32(G63)

Proposal Abstract C32(G63)

1. **Arms Control Problem:**

Nuclear weapons - comprehensive test ban
2. **Verification Type:**

 - (a) On-site inspection - selective
 - obligatory
 - (b) Short-range sensors - monitoring devices
 - (c) Seismic sensors - extra-border stations
 - intra-border stations
3. **Source:**

United Kingdom and United States. "Memorandum of position concerning the cessation of nuclear weapon tests". ENDC/78, 1 April 1963.

4. Summary:

This paper deals with verification arrangements to be applied to the nuclear weapons powers. The verification system proposed places primary reliance on national stations for the collection of seismic data, supplemented by the use of automatic stations plus a small number of on-site inspections to check suspicious unidentified events. The number of inspections per year which is acceptable to the UK and US is seven. These inspections would be reciprocal. Each side (i.e. the US and UK on the one hand, and the USSR on the other) would play the main role in the inspection though members of the international staff of the Control Commission would also be permitted to participate.

Detailed arrangements for these on-site inspections are spelled out in the paper. Each state would have up to 60 days from occurrence of a seismic event to designate it as one to be inspected. Procedures to be followed and required information are specified. The state where the event occurred would have one week to respond with any data it wished. During this week the designating state could retrieve the data records collected by the automatic seismic stations located on the territory of the receiving state. The designating state would have an additional week to evaluate this new information. If by the end of this week the designating state did not select the event, it would cease to be eligible for inspection.

Once an event was selected further information would be required from the designating state including proposed time of the inspection. The maximum area of the inspection would be 500 square miles.

The receiving state would have the right to indicate that a sensitive military installation was located in the area to be inspected. The designating state would then have the option of continuing the inspection but excluding the defence facility or cancelling the inspection. If a party felt this procedure was being abused it could withdraw from the treaty.

The receiving state would have responsibility for transporting the team to the inspection site. It would have the right to take measures to assure the security of its defence installations provided that the inspection team arrived promptly at the site. Examples of such measures are use of its own planes, and flight routes which avoid sensitive areas.

The inspection team personnel would be recruited from the inspecting nuclear side and from the international Commission. Fourteen technical experts from the nuclear state would be needed. Observers from the receiving state would also be present.

The inspection would include low-level aerial flights and photographs as well as ground teams given access throughout the area. Drilling would be permitted. If there was no drilling the duration of the inspection could be maximum of six weeks unless extended by mutual agreement. Findings from the inspection would be submitted within 30 days of completion.

The automatic seismic stations would be built by the state in which they were located. The other nuclear side would supply recorders and other instrumentation, some of which would be sealed in vaults. Data at each station would be produced and recorded in both the sealed vault and in separate structure. The information in the unsealed structure would be periodically forwarded to the parties and the Commission. The other nuclear side would have the right to visit the stations 8 times each year to obtain the data from the sealed vaults and for routine maintenance.

C33(G66)

C33(G66)

Proposal Abstract C33(G66)

1. **Arms Control Problem:**
Nuclear weapons - comprehensive test ban
2. **Verification Type:**
On-site inspection - selective
 - challenge
3. **Source:**
Sweden. ENDC/PV.247, 10 March 1966.
4. **Summary:**

If a suspicious event occurs on the territory of one party which other parties challenge then the standing of the suspected party in the international community would seem to make it imperative for that state to prove its innocence. In such a situation the suspected party might offer explanations and even invite an inspection.

If clarifying evidence is not brought forward, machinery for formal accusation would be set in motion, at first involving a demand by parties for clarification. A process of questioning and answering might then follow. Should these demands not be heeded or the information supplied be inadequate, a procedure for further recourse by the complainant would be necessary. Parties would have the ultimate sanction of withdrawal from the the treaty, but such a recourse should not, and probably would not, be exercised rashly.

Sweden suggests that a further possible option should be open to a party which is concerned about the possible violation of the test ban but still hesitant to abrogate the treaty. The suspicious party might find it useful to challenge the suspected party to issue an invitation for inspection. If such a challenge, perhaps demanded by several parties, went unheeded - and particularly if it went unheeded on several occasions - the case the abrogating the treaty would be strong.

Given this, Sweden asks whether obligatory on-site inspection as opposed to voluntary inspection by invitation will make legal justification for withdrawing from the treaty any stronger.

C34(G69)

C34(G69)

Proposal Abstract C34(G69)

1. **Arms Control Problem:**

Nuclear weapons - comprehensive test ban

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) International control organization
- (c) Seismic sensors

3. **Source:**

Nigeria, ENDC/PV.411, 15 May 1969.

See also: - ENDC/246, 15 May 1969.

4. **Summary:**

Nigeria contended that verification by seismic detection should be supplemented by another form of verification to allay fears of possible violation. On-site inspection had been rejected by some because of fears over espionage. Nigeria referred to a UK proposal to establish an international committee of parties to the treaty to undertake on-site inspection.* Inspections, when necessary, should be conducted by a group of non-aligned countries that have signed the Non-Proliferation Treaty and possess the technological know-how to undertake such inspections. Because the inspectors would be from states who were parties to the NPT they would not be likely to engage in espionage. Because they would be from non-aligned states the inspectors would not be likely to act as an agent for others. Such an on-site inspection would be undertaken only if there existed strong evidence of a violation which could not be conclusively proven by seismic data.

* See UK, ENDC/232, 20 August 1968, abstract C35(G69).

An earlier working paper, ENDC/232, outlines the possible composition of this committee. It would be composed of representatives of three non-aligned states and a nominee of the UN Secretary General or the IAEA. Apart from the single UN or IAEA representative, the members of the committee would be government representatives assisted by scientific advisors rather than scientists themselves. The right of on-site inspection would be exercised only if the committee agreed by a 5 to 2 majority that a prima facie case existed. While the committee would have a ultimate right of on-site inspection, this right would be circumscribed by the procedure proposed, so that it could not exercised improperly, but also it might not be exercised when it should be.

C36(A85)

C36(A85)

Proposal Abstract C36(A85)

1. Arms Control Problem:

Nuclear weapons - comprehensive test ban
- peaceful nuclear explosions

2. Verification Type:

- (a) On-site inspection - selective
- obligatory
- (b) Remote sensors
- (c) Seismic sensors - intra-border stations

3. Source:

Heckrotte, Warren. "Verification of Test Ban Treaties". In Verification and Arms Control, pp. 63-79. Edited by William C. Potter. Lexington, Mass.: D.C. Heath and Company, 1985.

4. Summary:

The author reviews the history of Soviet-American negotiations for the Threshold Test Ban Treaty of 1974 (see abstract K54(T74)), the Peaceful Nuclear Explosion Treaty of 1976 (see abstract C52(T76)) and for a possible comprehensive test ban treaty. The two major issues involved in a negotiated test ban are the installation of a seismic monitoring system and the role of on-site inspections to investigate suspicious seismic events. With regard to on-site inspections, the author discusses the difference between "voluntary" inspections and "guaranteed" inspections ("non-obligatory" vs. "obligatory"). Voluntary inspections involve a party's ability to refuse a request for permission to conduct an inspection of a suspicious event. The author concludes that purely bilateral inspection arrangements would mean that "the distinction between guaranteed and voluntary inspections in the test ban context is largely lost. At the base of this view is the assumption that no state would give another state carte blanche to cross its borders to investigate possible or alleged improprieties" (p.73).

Heckrotte states that "the provisions for OSIs [on-site inspections] under a CTBT should be simpler [than under the PNET], since the technically detailed provisions in the PNET for data exchange and yield-measuring equipment are not needed in a CTBT" (p.73). However, he adds, there are major differences between OSIs under the PNET and under a CTBT. Under the PNET, the party conducting the PNE decides the time and location of the OSI, but under a CTBT the party requesting an OSI would identify the location of any ambiguous event. Such a request could be interpreted as suspicion of a violation and thus arouse political sensitivity.

Verification methods for a comprehensive test ban would not be able to eliminate uncertainty completely. Violations of a test ban could be disguised or rendered undetectable through seismic

decoupling, i.e. conducting the explosion in a very large cavity. A decoupled explosion of one kiloton would produce a yield of one-hundredth of a kiloton. However, seismologists suggest that a system of seismic stations within the Soviet Union could detect such a low-yield explosion, although they disagree on the number and type of seismic stations required. At such a low seismic magnitude, there will still be hundreds of unidentified, ambiguous seismic events which could be explosions or earthquakes. On-site inspection could resolve such ambiguities, but the number of ambiguous events involved renders this proposal impractical. However, further research into the physics of decoupling may discover that the high frequency content of the seismic signal may permit identification of the event if the signal reduction is not substantial at high frequencies. Another possibility which may minimize the potential for evasion by decoupling is the use of non-seismic national technical means for observation and detection.

C37(G77)

C37(G77)

Proposal Abstract C37(G77)

1. Arms Control Problem:

Nuclear weapons - cruise missiles

2. Verification Type:

On-site inspection - selective

3. Source:

United States. National Security Council. Additional Arms Control Impact Statements and Evaluations for Fiscal Year 1978. Washington: US Government Printing Office, December 1977. (pp. 22-41). H462-60(CIS).

4. Summary:

This discussion of the cruise missile deals briefly with some of the verification problems which may be encountered in any attempt to limit the testing, development, production and deployment of cruise missiles. By its very nature, the cruise missile is especially difficult to detect and monitor. It is a small, low flying missile which follows the terrain closely and is able to evade most radar sensors. Identification of the cruise is also a formidable task since they may be launched in various modes, and the platforms themselves are often elusive, as is the case with both air and sea launched cruise missiles. "Another complicating feature is that cruise missiles of similar size and external configuration may have significantly different range capabilities" (p. 22). Some particular problems are also noted with specific reference to the air launched cruise missile (ALCM). Again, the ALCM may be adapted for launch from the surface or the air. It is virtually impossible to ascertain whether ALCMs carry a nuclear or conventional warhead, and the number of missiles on any given air platform is equally uncertain. These seemingly insurmountable obstacles to verification are compounded by the relatively high degree of assurance which is demanded by the US administration. This is not deemed to be a problem here as the Soviet Union does not as yet have a comparable cruise missile program, but could foreseeably become an important issue in the future. Officials insist that on-site inspection provides the only possible means of effectively verifying an agreement on cruise missiles, especially when the treaty in question is a stringent one. It is concluded that verification of the cruise missile is an undeniably difficult task and "the most inspectable limitation probably would be a total ban on testing and deployment of cruise missiles, entirely or in another launch mode" (p. 41). This would become more uncertain where short-range cruise missiles were still permitted, but chances are that any long-range system would be detected in the testing and development stages.

C38(A82)

C38(A82)

Proposal Abstract C38(A82)

1. **Arms Control Problem:**
Nuclear weapons - cruise missiles
2. **Verification Type:**
 - (a) On-site inspection - selective
 - (b) Remote sensors
3. **Source:**
Epstein, William. The Cruise Missile: A Prescription for Disaster, January 25, 1982.
4. **Summary:**

The specific features of the cruise missile are explained in this paper and their potentially destabilizing impact is then discussed in the context of verification. Its remarkable accuracy, low altitude flight, and small size make this a potentially lethal first strike weapon that is very difficult to detect. As such, they pose a serious threat to the current strategic balance; once they have been tested and deployed, the proliferation of cruise missiles will be virtually impossible to monitor or verify. They are so small that they may be easily hidden, and cannot be detected using national technical means of verification. Similarly, "there is no practical system of on-site inspection that would be able to verify their numbers and location once they exist in any large number" (p.3). Finally, while air-launched cruise missiles may be distinguished by the bombers that carry them, no such distinction is possible with submarine-launched or ground-launched cruise missiles. Consequently, there may be some difficulty in discerning cruise missiles from other weapons.

The ramifications are thus serious with regard to the prospects for nuclear disarmament. The conclusion here is that once these missiles have been tested and deployed, arms control will no longer be viable due to the impossibility of verifying any limitations on cruise missiles. The only way out of this dilemma that is envisaged is a comprehensive ban on the development and deployment of long-range cruise missiles. It is suggested that Canada defer on agreements regarding the testing of the cruise missile in Canada, and simultaneously strive to delay the deployment of cruise and Pershing in Europe. Finally, a study is recommended to consider the problems with the verification of cruise missiles.

C38.1(G85)

C38.1(G85)

Proposal Abstract C38.1(G85)

1. Arms Control Problem:

Nuclear weapons - cruise missiles

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors

3. Source:

- (a) United States. Congress. Senate. Committee on Armed Services. "Testimony of John F. Lehman, Secretary of the Navy". In Department of Defense Authorization for Appropriations for Fiscal Year 1986: Part 2: Army Programs, Navy-Marine Corps Programs, Air Force Programs. 99th Congress, 1st Session, February 6, 1985. Washington D.C.: US Government Printing Office, 1985, pp. 956-957.
- (b) United States. Congress. House of Representatives. Committee on Armed Services. "Testimony of Commodore Roger F. Bacon, Director of Strategic and Theatre Nuclear Warfare Division, Office of the Chief of Naval Operations". In Defense Department Authorization and Oversight: Hearings on H.R. 1872. 99th Congress, 1st session, March 13, 1985. Washington, D.C.: US Government Printing Office, 1985, pp. 494-495.

4. Summary:

Secretary Lehman stated to the Senate Committee that the US Navy did not think that the Tomahawk SLCM provided any more difficult a problem for arms control verification than existing systems. Personally, he felt that progress in arms control depended on the inclusion of on-site inspection techniques for verification. The Navy was ready to accept "whatever intrusive means of arms control inspection, including allowing Soviet inspection teams aboard our ships" which might be negotiated (p. 957).

Commodore Bacon stated to the House Sub-committee that the ability to distinguish a conventional Tomahawk from a nuclear one was "very hard through national technical means or from the observance of where Tomahawk would be stored". (p. 494) He reiterated that the US Navy "would invite the possibility of intrusive, on-site inspection as part of an arms control agreement -- on a reciprocal basis, mutually verifiable from both sides, with people actually on site to inspect" (pp. 494-495). He went on to say that to determine compliance ("whether it is a nuclear system or conventional, or what numbers are involved or whatever is being inspected under an agreed regime" (p. 495)) was difficult because after an inspection at a particular site, "things could change covertly very rapidly". Physical inspection procedures, and types of instruments to be used would be determined by negotiations. They would have to be specified and looked at very carefully.

C39(G62)

C39(G62)

Proposal Abstract C39(G62)

1. Arms Control Problem:

Nuclear weapons - fissionable material "cutoff"

2. Verification Type:

- (a) On-site inspection - selective
- (b) Records monitoring - plant
- (c) International control organization

3. Source:

United Kingdom. "The technical possibility of international control of fissile material production". ENDC/60, 31 August 1972.

4. Summary:

The paper foresees the creation of a Control Organization to verify a "cutoff". Its first duty would be to check the accuracy of declarations by states of the total quantity of fissile material. This would involve inspection of all existing stocks and records.

Controls over current production would need to be instituted and these would be on-going. The Control Organization would also have to guard against the possibility of clandestine production plants.

The bulk of the paper is an assessment of the accuracy which is technically possible for verifying the "cutoff" using the UK nuclear organization as a model. With regard to control of current production there would not be much variation from country to country. The Control Organization should be able to verify current production of plutonium to within 1 and 2 per cent and of U-235 to within 1 per cent.

The possibility of a violator successfully operating a large scale clandestine plant is remote. A smaller plant, however, might be able to secretly produce more fissile material than could be obtained by diversion from overt facilities.

The accuracy attainable for the verification of past production is much less than is possible for current production and would vary considerably from country to country. In those countries which have had a nuclear weapons programme, the Control Organization would be unable to guarantee that 10-20 per cent of the weapons had not been hidden.

The falsification of past records is possible but would require the bribing of a considerable number of staff. There would therefore be the possibility of some staff revealing the cheating. However, the fact that nobody revealed the forgery would not be evidence of the absence of forgery.

The Control Organization could not effectively check past production until its staff had been installed and had become familiar with the nuclear plants in the country concerned, a process which would take about a year. Since the checking of past production would

be difficult and done only once, the UK paper suggests temporarily augmenting the regular staff with more highly qualified personnel for a period of six months. It would therefore take about eighteen months from the date of installation of the control system before declarations about past production of fissile material could be verified.

The UK paper estimates that the Control Organization would require about 1500 scientists and a total complement of 10,000 personnel. Independence in recruitment would be necessary. The paper also describes some of the working conditions and the duties of staff.

C40(A83)

C40(A83)

Proposal Abstract C40(A83)

1. Arms Control Problem:

Nuclear weapons - fissionable material "cutoff"

2. Verification Type:

On-site inspection - selective

3. Source:

Gayler, Noel. "A Proposal for Deep Cuts". Bulletin of the Atomic Scientists 39 (December 1983): 46-47.

4. Summary:

The author calls for fifty percent reductions in US and Soviet nuclear weapon inventories. This would involve the conversion of nuclear weapons to nuclear fuel, a halt in the production of weapons-grade fissile material and a safeguards system to prevent the diversion of nuclear material for use in weapons. Each side would choose which weapons it wishes to give up and would identify the weapon with which each nuclear explosive device was associated. Since all explosive devices qualify, there is no difficulty in classifying weapons systems. The fissionable material would be extracted from each device and would be weighed in the presence of representatives of both countries. Each side would get credit for the weight of extracted fissionable material. The extracted material could then be converted for use in civilian nuclear power reactors under safeguards.

A total cutoff of the production of fissionable material would also be necessary to prevent the replacement of extracted material. Inspection of nuclear power plants could verify that nuclear material is not being diverted. Both sides might be more receptive to the idea of inspection by a bilateral body rather than an international body even though each has already agreed in principle to IAEA inspection of commercial power plants.

C41(A61)

C41(A61)

Proposal Abstract C41(A61)

1. **Arms Control Problem:**

Nuclear weapons - manned aircraft

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Remote sensors - aerial

3. **Source:**

Wiesner, J.B. "Inspection for Disarmament". In Arms Control: Issues for the Public, pp. 126-127. Englewood Cliffs, New Jersey: Prentice-Hall, 1961.

4. **Summary:**

This proposal envisages the verification of an agreement limiting the number of manned bombers to be retained by each country by means of on-site inspection of airfields and factories producing aircraft. Initial disclosures of retained aircraft would be verified by inspection of airfields, while the veracity of the disclosure of airfield locations can be verified by random search and aerial photography. Intelligence sources would also be tapped to this end. Limits on aircraft production would be verified by on-site inspection.

C42(G62)

C42(G62)

Proposal Abstract C42(G62)

1. Arms Control Problem:

Nuclear weapons - manned aircraft

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors - aerial
 - radar

3. Source:

United Kingdom. "Preliminary study of problems connected with the verification of the destruction of certain nuclear delivery vehicles". ENDC/54, 1 August 1962.

4. Summary:

Under the proposed system aircraft to be destroyed would be required to fly to a destruction centre. This would ensure that the machine was airworthy, and would make it more certain that operationally complete aircraft had been destroyed than if crates of components were delivered to the destruction centre.

If it were necessary to ensure that the planes were fully operational, they might be required to carry out certain exercise prior to destruction. For instance, the aircraft might be required to make a sortie at normal operating altitudes and speed to its full operational radius or action, drop practice bombs under specified conditions and then return to the airfield at the destruction centre.

Remote monitoring, using radar and aerial sensors could verify compliance with these requirements and could also ensure that other aircraft were not substituted during the course of the exercise.

These procedures would not require the disclosure of details of the aircraft's construction. If it were thought necessary to check the quality of the aircraft by means other than a test flight, a test centre might be set up.

To destroy about 500 aircraft the international inspectorate would require perhaps 10 key engineers, 20-30 supervisors and some clerical help.

C43(A63)

C43(A63)

Proposal Abstract C43(A63)

1. Arms Control Problem:

Nuclear weapons - missile tests

2. Verification Type:

- (a) On-site inspection - selective
- (b) International exchange of information
- (c) International control organization

3. Source:

Singer, J.D. Deterrence, Arms Control and Disarmament. Columbus:
Ohio State University Press, 1963.

4. Summary:

This proposal calls for all missile tests to be pre-announced as regards date, time, flight and orbit path, and payload characteristics. An international control agency would send observers to the launch site prior to the flight to confirm the information provided by the nation conducting the test. Free access to all relevant launch facilities would be required. If all safety requirements were met, the test would proceed and the agency would assume responsibility for broadcasting all relevant data until the test was completed or the satellite was in orbit. All governments would have access to information regarding the test as broadcast by the agency.

C44(A80)

C44(A80)

Proposal Abstract C44(A80)

1. **Arms Control Problem:**

Nuclear weapons - mobile ballistic missiles

2. **Verification Type:**

On-site inspection - selective
- sampling

3. **Source:**

Berinati, V.J. and J.H. Henry. A Comparison of the Characteristics of Three Sampling Schemes for the Verification Inspection of Certain MX ICBM System. Arlington, Virginia: Institute for Defence Analyses, March 1980. IDA Paper P-1478. NTIS AD-A088580.

4. **Summary:**

In order to verify the number of missiles deployed in an MX-type ICBM Multiple Protective Structure system, some type of periodic inspection may be necessary. This paper assesses three proposed sampling schemes for such verification. Each scheme is aimed at providing reasonable probability of detection with requiring inspection of an excessive number of shelters. The factors affecting each scheme which are compared include:

- (1) detection probability
- (2) geographic distribution of shelters to be inspected,
- (3) the number of occupied and empty shelters disclosed in the inspection,
- (4) the need for a master list of deployed missile locations, and
- (5) possible deployer cheating strategies.

The three schemes are examined on the basis of a single deployment model: 4000 shelters, 200 legal missiles and from 20 to 200 illegal missiles. The authors conclude that none of the three methods appears superior to the other on all the evaluation criteria.

C45(A76)

C45(A76)

Proposal Abstract C45(A76)

1. Arms Control Problem:

- (a) Nuclear weapons - partial test ban
 - peaceful nuclear explosions
 - proliferation
- (b) Chemical weapons - stockpiling
 - production
 - destruction of stocks

2. Verification Type:

- (a) On-site inspection - selective
 - obligatory
 - IAEA safeguards
- (b) Remote sensors - satellites
 - ground-based
 - sampling
- (c) International control organization

3. Source:

Fischer, Georges. "L'Inspection et le Contrôle des Armements". (Inspection and Arms Control). In L'Inspection Internationale, pp. 59-135. Edited by Georges Fischer and Daniel Vignes. Brussels: Bruylant, 1976.

4. Summary:

The author reviews national positions on on-site inspection as demonstrated in negotiations on the Limited Test Ban Treaty (see abstract J120(T63)), the Peaceful Nuclear Explosions Treaty (see abstract C52(T76)), the Non-Proliferation Treaty (see abstract D9(T68)) and a chemical weapons convention. He attempts to explain what led states to reject on-site inspection in favour of other solutions in certain circumstances. For example, the Soviet Union viewed national means of verification as adequate to monitor compliance with the Limited Test Ban Treaty. The treatment is largely historical and narrative.

C46(A83)

C46(A83)

Proposal Abstract C46(A83)

1. Arms Control Problem:

- Nuclear weapons - partial test ban
- peaceful nuclear explosions
- comprehensive test ban

2. Verification Type:

- (a) On-site inspection - selective
- (b) Seismic sensors

3. Source:

Heckrotte, Warren. "Negotiating with the Soviets". Energy and Technology Review (May 1983): 10-19.

4. Summary:

This article reviews the negotiations which led to the Threshold Test Ban Treaty (see abstract K54(T74)) and the Peaceful Nuclear Explosions Treaty (see abstract C52(T76)) and negotiations for a comprehensive test ban treaty (CTBT). The author notes the gradual acceptance by the Soviet Union after 1974 of cooperative measures to enhance national technical means and the acceptance in principle of "voluntary" on-site inspections under treaty established procedures during the CTB negotiations. This indicates that the Soviets are prepared to accept some measure of intrusive verification to reach agreement on test ban treaties. However, they still seek to limit or restrict technical parameters and the degree of access. They are also concerned about preventing the acquisition of information not required for verification and about being harassed by verification procedures. Acceptance of inspection measures for test ban treaties does not imply that the Soviets would accept them for other arms control agreements, but it shows that there is no automatic rejection of such measures.

C47(G84)

C47(G84)

Proposal Abstract C47(G84)

1. **Arms Control Problem:**

Nuclear weapons - partial test ban

2. **Verification Type:**

On-site Inspection - selective

3. **Source:**

United States. President Reagan. "Address to the General Assembly of the United Nations." UN Doc. A/39/PV.4, 24 September 1984.

See also: - International Herald Tribune, 30 July 1983, p. 1

- New York Times, 20 December 1985, p. 7.

- New York Times, 25 December 1985, p. 1.

- Arms Control Reporter (1986): pp. 605.B.38-605.B.39 and pp. 605.B.40-605.B.43.

- Arms Control Reporter (1987): pp. 605.D.7-605.D.9.

4. **Summary:**

Having reviewed American foreign policy goals, President Reagan outlined some concrete proposals for future US/USSR arms control. Among these, Reagan suggested that "we find a way for Soviet experts to come to the United States nuclear test site and for ours to go to theirs, to measure directly the yields of tests of nuclear weapons" (p.16). He then expressed the desire to make such arrangements by the spring of 1985, and called for Soviet cooperation to "reciprocate in a manner that will enable the two countries to establish the basis for verification for effective limits on underground nuclear testing" (p. 16).

The US invitation to the USSR to send a team of experts to observe and measure an American nuclear explosion in Nevada was reiterated on 29 July 1985 as reported in the International Herald Tribune (30 July 1985, p.1). The Soviets were invited to bring any instrumentation they needed. The invitation was rejected by the Soviet Union.

The New York Times (20 December 1985, p. 7) reported that the Soviet leader Mikhail Gorbachev sent President Reagan a letter on 5 December 1985 proposing verification measures for a moratorium on nuclear testing. The Soviet proposal involved monitoring by seismic equipment stationed in Argentina, Greece, Tanzania, Sweden India and Mexico. (The leaders of these six nations had offered in October 1985 to help monitor a CTB). In addition, US observers could visit Soviet test sites to investigate "ambiguous phenomena" and resolve "possible doubts" about Soviet compliance. The US rejected participation in the moratorium, but the New York Times (25 December 1985, p.1) reported that President Reagan sent a reply to Mr. Gorbachev suggesting that American and Soviet experts meet to discuss the verification issue.

The letter reiterated that improved verification would allow the US to ratify the Threshold Test Ban Treaty (K54(T74)) and the Peaceful Nuclear Explosions Treaty (C52(T76)).

On 14 March 1986, President Reagan proposed bilateral discussions to find ways to improve verification of the TTBT and PNET. He also invited the Soviet Union to send scientists to monitor planned US weapons test and to examine the CORRTEx (Continuous Reflectometry for Radius Versus Time Experiment) method for determining test yields. If the USSR would agree to effective verification of the TTBT and PNET, the US would proceed with ratification. The two sides agreed on 9 July to meet on the nuclear testing issue and meetings were held 25-31 July and 4-15 September. The discussions reportedly included on-site inspection and use of the CORRTEx method.

On 13 January 1987, President Reagan submitted the TTBT and PNET to the US Senate for ratification with the condition that the US and USSR agree to additional measures to effectively verify the treaties.

5. **Selected Comments of States:**

The FRG (CD/PV.326, 1 August 1985) notes that the question of verification is the most important unsolved problem in attempts to reach a comprehensive test ban treaty. The delegate commented that "the merit of the United States proposal -- an invitation allowing precise measurements and calibration of instruments on site -- is that it can contribute to giving a new impetus to the verification debate. On the other hand we regret that the short term moratorium proposal of the Soviet Union does not address the verification problem at all. This limits its contribution to a durable solution of the problems at hand" (p.14).

C48(G71)

C48(G71)

Proposal Abstract C48(G71)

1. Arms Control Problem:

Nuclear weapons - peaceful nuclear explosions

2. Verification Type:

- (a) On-site inspection - selective
- (b) International control organization

3. Source:

Netherlands. CCD/PV.512, 29 April 1971.

4. Summary:

An international body should be authorized to satisfy itself that only nuclear devices already tested are being used for peaceful applications. Reference is made to an IAEA document (GOV/1433) which proposes that any nuclear device supplied to a non-nuclear weapon state by a nuclear weapon state must be specified as to its characteristics. This would make it unlikely that any untested military device could be used, and therefore that any valuable military information could be derived by the nuclear weapon state from the PNE.

C49(I73)

C49(I73)

Proposal Abstract C49(I73)

1. **Arms Control Problem:**

Nuclear weapons - peaceful nuclear explosions

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Short-range sensors - monitoring devices
- seals

3. **Source:**

International Atomic Energy Agency. "Guidelines for the international observation by the Agency of nuclear explosions for peaceful purposes under the provisions of the Treaty on the Non-Proliferation of Nuclear Weapons or analogous provisions in other international agreements". INFCIRC/169, 16 January 1973.

4. **Summary:**

The basic purpose of international observation is to verify that Articles I and II and NPT are not violated in the course of conducting a PNE. Such observation is required when the PNE is carried out through the IAEA or pursuant to bilateral agreements under Article V of the NPT or other international agreements.

The observation will be undertaken according to a specific agreement with the countries involved concluded 60 days before the transport of the nuclear device from the nuclear weapon state.

Among the IAEA's responsibilities are:

- provision of an adequate number of observers,
- carrying out only those activities needed to perform its observation functions in a manner to avoid hindering the PNE; and
- informing all IAEA members of actions which contravene the NPT.

The responsibilities of other parties include:

- planning and conducting PNEs so as to prevent disclosures of design information,
- providing an opportunity for observation, and
- cooperating with Agency observers.

Among the provisions of the Observation Agreement will be the requirement for sufficiently detailed information on the project necessary for observations including description of transportation canister, emplacement of the device and the predicted on-site physical effects of the explosion, together with detailed plans for the observation including a description of equipment to be used by the observers.

Observation will begin when the device leaves the nuclear weapon state except for the purpose of affixing seals to the device.

Surveillance will continue on a 24-hour per day basis. Continuous visual observation is desirable but other techniques may be used if the parties to the observation agreement consider them adequate.

These methods include:

- technical means of surveillance (eg. security seals),
- exterior observation of buildings to verify entry of authorized personnel only,
- observation of the surface of the emplacement area after emplacement, and
- appropriate inspection to ensure no attempt to obtain radioactive material.

After the detonation the observers will determine whether the device has been detonated (eg. using ground motion instrumentation). The observers will also determine whether the explosion took place in accordance with the declared purpose of the PNE.

Within 90 days of the PNE detonation, the observers are to report to the Director-General of the Agency who will issue a Record of Observation and report to the Board of Governors.

In the case of PNEs conducted for emergency purposes (eg. oil well fire) special measures may be taken consistent with the guidelines above.

Parties to the Observation Agreement have the right to refuse specific observers. If there is repeated refusal of all observers, the Director General can refer the matter to the Board of Governors for appropriate action.

The Agency will give 3 weeks notice of the arrival of the observers. Further details of the actual visits of the observers are also outlined in the Guidelines.

C50(G75)

C50(G75)

Proposal Abstract C50(G75)

1. Arms Control Problem:

Nuclear weapons - peaceful nuclear explosions

2. Verification Type:

- (a) On-site inspection - selective
- (b) International control organization

3. Source:

Canada. CCD/PV.672, 15 July 1975.

4. Summary:

A PNE capability and a nuclear weapons capability have become indistinguishable. For a non-nuclear weapon state to have an independent capacity to conduct PNEs is incompatible with non-proliferation objectives since knowledge gained from PNEs has military applications. No form of international observation of the PNE can prevent this; nor can such verification ensure that the states conducting the PNE has not already developed or that it is not in the process of developing a nuclear weapons capability. Therefore, non-nuclear weapons states should obtain peaceful benefits of nuclear explosions only through the services of present nuclear weapon states. Such services must be conducted under the international observation and international procedures required by Article 5 of the Non-Proliferation Treaty and in accordance with other applicable international obligations as stated in the first NPT Review Conference's Final Declaration. The IAEA is the body through which non-nuclear weapon states should receive PNE benefits.

C51(G76)

C51(G76)

Proposal Abstract C51(G76)

1. **Arms Control Problem:**

Nuclear weapons - peaceful nuclear explosions

2. **Verification Type:**

On-site inspection - selective

3. **Source:**

Sweden. "The Test Ban Issue". CCD/481, 26 March 1976.

4. **Summary:**

An essential problem with regard to a comprehensive test ban is to avoid the possibility that PNEs will be used to develop and test military devices. This problem can be solved through the use of expert observation and on-site inspection of PNEs. One possibility would be to monitor the composition of radioactive debris produced at the explosion site and thereby check that only nuclear devices of well-known design had been used. Another quite effective way would be to ensure, by expert inspection, that the blasts are not used for diagnostic measurements of the explosion in its very early stages.

C52(T76)

C52(T76)

Proposal Abstract C52(T76)

1. Arms Control Problem:

Nuclear weapons - peaceful nuclear explosions
- partial test ban

2. Verification Type:

- (a) On-site inspection - selective
- obligatory
- (b) Short-range sensors - monitoring devices
- (c) Seismic sensors - extra-border stations
- intra-border monitoring
- (d) International exchange of information
- (e) Complaints procedure - consultative commission

3. Source:

United States/Union of Soviet Socialist Republics. "Treaty between the US and the USSR on underground nuclear explosions for peaceful purposes" and Protocol. (The PNE Treaty). CCD/496, 23 June 1976.

Signed: 28 May 1976.

Submitted for ratification - to US Senate: 29 July 1976. (It has not yet been ratified).*

- to USSR Supreme Soviet: 11 August 1976.

See also: - United States. CCD/PV.719, 10 August 1976.

- Abstract C47(G84)

4. Summary:

The following is a summary of American statements in PV.719. The Treaty together with the Threshold Test Ban Treaty (TTBT)** establishes a comprehensive system of regulations governing all American and Soviet underground tests. These Treaties cover all underground explosions permitting blasts outside specified test sites only when conducted for peaceful purposes***. The PNE Treaty also governs tests by either party on the territory of other states.

* On 13 January 1987, President Reagan submitted this treaty and the TTBT to the US Senate for ratification with the condition that the US and USSR agree to additional measures too effectively verify the treaties.

** See abstract K54(T74)

*** There is an agreed statement attached to the PNE Treaty which makes it clear that developmental testing of PNEs is not to be considered a peaceful application and therefore must be conducted at designated nuclear weapons test sites under the TTBT.

The treaty sets a limit of 150 kt on any single PNE, a yield limit identical to that of the TTBT. "Group" explosions are also covered, meaning several individual explosions in such close spacial and temporal proximity that teleseismic monitoring cannot distinguish them. The Treaty provides that an aggregate yield of a group shall not exceed 1500 kt. In the case of such group explosions, the Treaty provides that observers from the verifying side will have the right to be present on-site before, during and after the explosion, where they will be permitted to identify each individual component explosion, measure its yield and confirm that the circumstances of the blast are consistent with its stated peaceful purposes.

In order to measure the yield, the verifying personnel can choose to bring their own equipment to the site of the blast or they can use equipment provided by the country conducting the explosion. In the former case, there is a procedure for shipment of two identical sets of equipment to a port of entry of the other party, which would then choose the set to be used in the verification process. Within each of these sets are, in turn, duplicate components for making measurements and recording data. After the explosion, another selection procedure, this one by an agreed process of change, will allow the verifying side to retain one of the two identical sets of measurement and data recording components while the other party may retain the remaining set for a specified time. In this way the right of both sides are protected - the right of the verifying side to a valid set of measurements and the right of the other side to assurance that the equipment is not being misused to acquire unwarranted information.

When the yield of a group explosion is between 500 and 1500 kt the observers have the additional right to deploy a network of seismometers in the vicinity of the emplacement points of the explosion in order to ensure that no undeclared explosions are detonated along with the group. Similar procedures for selecting and using this equipment to those described above apply in this context.

For blasts between 100 and 150 kt, observers will be present if the need for their presence is mutually agreed on the basis of information made available by the party carrying out the explosion or by the verifying side. Under these circumstances the principal job of the observers will be to confirm geological and other data in order to assist teleseismic monitoring. It should be noted that observers also confirm geological and other information provided by the party conducting the blast when aggregate yields are above 150kt.

The scope of the observers' functions increases with the aggregate yield of the blast because at higher yield there would be greater opportunity for evading detection of a violation of the 150kt limit on individual explosions (i.e. detonating unannounced blasts of a yield over 150kt under cover of a group explosion).

Below 150 kt, unless the presence of observers is agreed upon, the Treaty provides for verification of the basis of national technical means, supplemented by detailed information supplied by the party conducting the explosion. These national technical means, assisted by such data, provide adequate assurance that individual

blasts will not be conducted with yields greater than 150 kt. There is a scaling of yields and verification measures with respect to the amount of information provided. For each explosion with an aggregate yield greater than 50 kt information would be given about purpose, location, date, planned yield, depth, geology, number of explosives and relative locations, specific geological features affecting the determination of yield, and confirmation of purpose. This information would be provided within 30 days of the commencement of emplacement of explosives. For explosions of lower yields the information requirements decrease. For yields of 75 kt or greater more extensive information is required. For explosions with aggregate yields exceeding 100 kt the information must be provided at least 100 days before emplacement. For all blasts, additional information including the actual time and the aggregate yield must be provided not later than 90 days after the explosion.

The PNE Treaty also provides that PNEs must conform to other international agreements of the parties (e.g. the Limited Test Ban Treaty, and the Non-Proliferation Treaty).

In addition to the provisions above for supplying information, the Treaty provides for the establishment of a Joint Consultative Commission to facilitate additional exchanges of information, the establishment of procedures for the efficient implementation of the verification procedures, and consultations regarding any complaints.

The Protocol spells out in detail the procedures to be followed during observation, including the number of observers, the geographical extent of their access, the provision of certain information such as maps to assist in planning observation activity, and essential matters of a legal nature related mainly to immunities for the observers, their quarters, equipment and records. It also provides for certain additional constraints in order to assure functioning of the verification procedures and to limit the opportunity for gaining weapons related information. An example of the former is the set of formulae dealing with allowed maximum and minimum distances between individual explosions within a group. An example of the latter is the minimum depth requirement on any explosive emplacement point (explosives buried at a lesser depth could provide militarily significant information on blast and electromagnetic effects).

It should be noted that the PNE Treaty has been negotiated specifically to complement the weapons testing limitation of the TTBT. It does not deal with the problem of how to provide for PNEs in the context of a lower threshold or of a CTB.

On 17 February 1983, the US submitted to the USSR a request for improving the verification provisions of both the PNET and the Threshold Test Ban Treaty (see abstract K54(T74) in order to remove existing uncertainties regarding compliance. The USSR rejected this request on 28 March 1983 saying that the uncertainties referred to by the US would not have arisen if the verification provisions of these unratified treaties had been utilized. (Source: SIPRI Yearbook, 1984, p. 677).

Text of Main Verification Related Provisions:

Article 4

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall:

(a) use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law; and

(b) provide to the other Party information and access to sites of explosions and furnish assistance in accordance with the provisions set forth in the Protocol to this Treaty.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1(a) of this article, or with the implementation of the provisions of paragraph 1(b) of this article.

Article 5

1. To promote the objectives and implementation of the provisions of this Treaty, the Parties shall establish promptly a Joint Consultative Commission within the framework of which they will:

(a) consult with each other, make inquiries and furnish information in response to such inquiries, to assure confidence in compliance with the obligations assumed;

(b) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;

(c) consider questions involving unintended interference with the means for assuring compliance with the provisions of this Treaty;

(d) consider changes in technology or other new circumstances which have a bearing on the provisions of this Treaty; and

(e) consider possible amendments to provisions governing underground nuclear explosions for peaceful purposes.

2. The Parties through consultation shall establish, and may amend as appropriate, Regulations for the Joint Consultative Commission governing procedures, composition and other relevant matters.

C53(A70)

C53(A70)

Proposal Abstract C53(A70)

1. Arms Control Problem:

Nuclear weapons - reentry vehicles

2. Verification Type:

On-site inspection - selective

3. Source:

Scoville, H. "Verification of Nuclear Arms Limitations". Bulletin of the Atomic Scientists 26, no. 8 (October 1970): 6-12.

4. Summary:

The author, while recognizing the excessively intrusive nature of his proposal, suggests that on-site inspection is the only means by which detection of MIRVed vehicles could be assured with absolute certainty. Such a system would include the right to inspect any deployed missile on sufficiently short notice so as to prevent substitution of reentry vehicles. It would further involve access by the inspectors to the interior of the reentry vehicle, or at the very least, the use at close range of some technique such as x-ray sensing in order to determine the number of warheads on a given missile.

It is recognized by the author that this system would be unacceptable to both the United States and the Soviet Union. Consequently, he suggests that a ban on testing of MIRVed vehicles, verified by national means should be attempted.

C54(A61)

C54(A61)

Proposal Abstract C54(A61)

1. **Arms Control Problem:**

Nuclear weapons - research and development

2. **Verification Type:**

- (a) On-site Inspection - selective
- (b) Records monitoring - economic
- personnel

3. **Source:**

Wiesner, J.B. "Inspection for Disarmament". In Arms Control: Issues for the Public, pp. 135-136. Edited by L. Henkin. Englewood Cliffs, New Jersey: Prentice-Hall, 1961.

4. **Summary:**

This proposal envisages a system of on-site inspection of weapons research and development laboratories and weapons testing facilities. Data-gathering techniques which would include monitoring of economic and personnel records, would comprise a central part of the verification system.

An typology of research and development facilities based on the relative importance of activities could be developed, on which basis the frequency of inspections would be decided. A central control body would be charged with the processing and evaluation of the data collected by the inspection teams.

France proposes that the World Health Organization (WHO) be called upon to investigate alleged violations of the 1925 Geneva Protocol. Procedures for examining cases of poisoning which have been developed by WHO could be utilized. Clinicians with the ability to diagnose symptomatology associated with poisoning caused by chemical agents would examine suspected victims and compare their observations with information on the pathological profile and the epidemiology of the region. Laboratory analysis of samples taken from a site and from potential victims would provide identification of agents. WHO could prepare a list of a laboratories which could conduct such analysis. France urges the secretariat to conduct a study aided by experts including a representative of WHO, on specific fact-finding arrangements related to investigating the alleged use of gases or bacteriological agents or violations of the 1925 Protocol.

- (1) guidance for the SG for gathering qualified experts;
- (2) guidance for the classification of laboratories to be available for sample analysis;

- (3) an illustrative list of types of equipment needed for an investigation which should be stockpiled by the SG (ie. protective equipment, field detection equipment, sampling and packing equipment and medical supplies);
- (4) procedures and criteria for selection of members of the team of experts whose functions will be fact-finding and evaluation (a core team would consist of three members: i) a military expert, a chemist or microbiologist; ii) a physician, a forensic pathologist, or a veterinarian; and iii) a psychologist, a sociologist; an ethnologist or a cultural anthropologist);
- (5) requirements for security arrangements and logistic support;
- (6) procedures for an on-site or near-site inspection (these include: i) evaluation of the complaint; ii) meeting with local authorities; iii) examination of the alleged attack site; iv) interviews with alleged victims; v) medical examination of the alleged victims and their medical records; vi) interviews with eyewitnesses to the alleged attack; and vii) interviews with local authorities);
- (7) standards for the collection and handling of samples;
- (8) methods for preservation of samples;
- (9) choice of laboratories and procedures for the preparation, transmission and analysis of samples;
- (10) procedure for transportation of samples; and
- (11) the information to be contained in the report of the team of experts.

The GCE report next turns to the specific tasks relevant to the organization and conduct of an investigation. These are broken down by three phases: (1) preparatory phase, (2) evaluation of complaints phase, and (3) actual investigation.

In terms of assembling and systematic organization of documents relating to the identification of CBW use, the GCE identified the needs of the team of experts to be: (1) general information of the sort useful to investigators in the field, and (2) specific and detailed information needed for analyzing evidence after completion of the field work. The GCE had neither the time nor expertise to develop a standard handbook of signs, symptoms and medical treatment for CBWs. [In this regard, see abstract C57(G85).] Instead it developed a guide to available documentation, which could be regularly updated.

The GCE report concludes by calling on governments and other organizations to cooperate fully with the SG to regularly update the list of experts and laboratories designated to assist an investigation and to communicate new information regarding technical aspects of procedures and documentation. The SG should also regularly update the technical and administrative aspects of the report.

The appendices to the GCE report include:

- (1) a discussion of the time aspects to be taken into account for the initiation of an investigation;
- (2) specialties needed for an investigation;
- (3) types of laboratories needed;
- (4) items that might be required for an investigation;

- (5) model clauses for an exchange of letters between the UN and states involved in the conduct of an investigation relating to security, logistic support, transportation and laboratory analysis;
- (6) illustrative questionnaire for interviews;
- (7) sample handling for CW agents;
- (8) general references concerning health aspects of potential CBW agents;
- (9) lists of potential CBW agents; and
- (10) specific references concerning health aspects of potential CBW agents.

1. Arms Control Problem:

Chemical and biological weapons - use

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
- (b) Short-range sensors - monitoring devices
 - sampling
- (c) Non-physical/psychological inspection
- (d) International control organization

3. Source:

Canada. Department of External Affairs. Handbook for the Investigation of Allegations of the Use of Chemical or Biological Weapons. Ottawa, November 1985.

See also: - United Nations. Secretary-General. "Report of the Group of Consultant Experts established in pursuance of General Assembly Resolution 37/98 D on provisional procedures to uphold the authority of the 1925 Geneva Protocol". A/39/488, Annex II, 2 October 1984. (abstract C56(I84)).

4. Summary:

This Handbook was prepared in response to the final report of the Group of Consultant Experts (see abstract C56(I84)) which indirectly identified the need for the development of a handbook for the use of experts during the investigation of allegations of the use of chemical and biological weapons. The Handbook is a technical manual for field use. It outlines the procedures for a combination of on-site inspection methods which are to be used simultaneously: sampling, base camp laboratory analysis and interviewing of victims and observers of alleged use of chemical or biological weapons. With regard to preparation for an investigation, the Handbook notes that "a prompt response on the part of the international authority will be crucial to any attempt to confirm or to refute an allegation of the use of chemical or biological weapons" (p.v).

The Handbook covers the following topics:

- (1) Outline of a verification procedure including sample collection, base camp analysis, transmission of samples to designated laboratories for corroborative or further analysis, and interviewing;
- (2) Personnel and equipment requirements;
- (3) On-site screening and sampling methodology;
- (4) Base camp analysis of samples and preparations for preservation, storage and further analysis;
- (5) Interviewing (a sample questionnaire is provided);

- (6) An epidemiological survey (epidemiology is the study of the distribution and determinants of disease in human populations; a detailed questionnaire can determine the presence of various signs and symptoms in both a control group and the group under study);
- (7) Designated laboratory analysis; and
- (8) General information on the properties, characteristics, toxicology and symptomatology of some 25 known chemical and 16 potential biological warfare agents along with cautions as well as suggested first aid and therapy for treatment of their effects.

The Handbook notes that the designated laboratories conducting sample analysis would report their findings to the investigating team through the headquarters of the international authority. The investigating team would later present its report to the international authority along with supporting material (questionnaire response sheets, photographic documentation, etc.).

C58(A83)

C58(A83)

Proposal Abstract C58(A83)

1. Arms Control Problem:

- (a) Chemical and biological weapons - use - "yellow rain"
- (b) Nuclear weapons - proliferation

2. Verification Type:

- On-site inspection - selective
 - sampling
 - IAEA safeguards

3. Source:

Bartley, Robert L. and William P. Kuzewicz. "'Yellow rain' and the Future of Arms Agreements". Foreign Affairs 61, no. 4 (Spring 1983): 805-826.

4. Summary:

This article discusses the problems of verification and post-detection response with possible violations of the 1972 Biological Weapons Convention and with other arms control agreements. Reports of the use of biological weapons (dubbed 'yellow rain') by the armed forces of Laos and North Vietnam against the H'Mong people of Laos in 1975 were at first greeted with skepticism in the West. The authors report, however, that by the end of 1982, the facts of the use of 'yellow rain' had been accepted by the western media and the American government. A report by the UN investigative team sent to Pakistan concluded that allegations of the use of chemical weapons by the Soviet Union in Afghanistan were not proven, but circumstantial evidence did suggest the possible use of some toxic chemical substance.

The incidents associated with 'yellow rain' have occurred at a time when capabilities for verifying arms control agreements are seriously in question. Intercepting Soviet communications signals may be an unreliable method because of the possibility of double agents planting misinformation. Small, mobile weapons pose new challenges for verification. Excessive faith in on-site inspection may be unjustified. The Soviets have indicated that they may be willing to open some of their nuclear power reactors to inspections by the IAEA, but such inspections require substantial advance notice. It is possible that a nation could comply with IAEA regulations and still be able to assemble a nuclear weapon within hours. On-site inspection of this sort would not create high confidence in the ability to detect violations of the Biological Weapons Convention. However, the experiences of detecting the use of biological and chemical weapons suggests that violations of the Convention can be detected, but only by a lengthy, arduous process after the fact. Furthermore, the problem of responding to a detected violation still remains.

C59(A84)

C59(A84)

Proposal Abstract C59(A84)

1. Arms Control Problem:

- (a) Chemical and biological weapons - use - "yellow rain"
- (b) Chemical weapons - production
- stockpiling

2. Verification Type:

- (a) On-site inspection - selective
- sampling
- (b) Complaints procedure - consultative committee
- (c) International exchange of information

3. Source:

Smith, Elizabeth. "International Regulation of Chemical and Biological Weapons: 'Yellow Rain' and Arms Control". University of Illinois Law Review no. 4 (1984): 1011-1073.

4. Summary:

This article reviews evidence for allegations of the use of biological weapons, so-called 'yellow rain' in Southeast Asia and considers the applicability of 1925 Geneva Protocol and the 1972 Biological Weapons Convention (see abstract 012(T72)) to these cases to determine whether there has been a violation of international law or an arms control agreement. The article also reviews the drafts for a chemical weapons convention submitted by the Ad Hoc Working Group on Chemical Weapons of the Committee on Disarmament (CD/416, August 22 1983) and by the United States (see abstract C79(G84) and makes recommendations to improve the drafts.

The author considers the evidence which has been collected primarily by the United States, criticism of the validity of the evidence and possible alternative explanations for the phenomenon of 'yellow rain'. She states that the evidence is "far from conclusive" (p. 1013). As a result, "absolute conclusions about the validity of asserted violations of international law are inappropriate due to the seriousness of the allegations and the absence of a neutral fact-finding process" (p. 1057).

The Geneva Protocol does not apply to the situations in Southeast Asia and Afghanistan because the Protocol prohibits the use of chemical and biological agents in war and the legal definition of war does not encompass the conflicts in those areas. Furthermore, Afghanistan, Kampuchea and Laos are neither signatories nor parties to the protocol, therefore its provisions do not apply to them. The author adds that the Geneva Protocol is a law governing the humanitarian conduct of war, not an arms control agreement; the Protocol prohibits only the use of chemical and biological weapons, not their development, production, stockpiling or transfer.

As an arms control agreement, the Biological Weapons Convention is more extensive in scope than the Geneva Protocol. If allegations of the use of biological weapons in Southeast Asia and Afghanistan are valid, then the Soviet Union, Vietnam and Laos are guilty of violating the Convention, but, as suggested above, the evidence is inconclusive. The Convention requires a complex factual determination of the presence and source of biological agents and of the use of the agents as weapons.

The author notes that the drafts for a chemical weapons convention are improvements upon the Geneva Protocol and the Biological Weapons Convention, but they still contain loopholes. In order to close these loopholes, a definition of "toxic chemical substances" should explicitly include "toxins" and the convention should specify, as in the American proposal whether prohibitions cover riot control agents and herbicides. The convention should also cover future developments in chemical technology which could be used in weapons.

Both the American and Ad Hoc Working Group drafts make provisions for a consultative committee to monitor activities, coordinate the exchange of information and resolve minor misunderstandings between parties. The author suggests that the Executive Council of the Consultative Committee should be composed of seven permanent members, whose stockpiles of chemical weapons exceeded a specified level on a certain date, and eight members who serve on a rotational basis. Permanent member status would be attractive to countries wishing to be involved in all activities, but the fact that the non-permanent members outnumber the permanent members would encourage ratification of and accession to the convention by other parties as well. All parties should be able to bring complaints before the Executive Council. Procedural matters should require a simple majority vote and substantive matters should require ten affirmative votes.

The author supports on-site inspection at the site of alleged use with limited advance notice. The nation being inspected should not have a representative on the group conducting the investigation, but should be able to appoint a liaison officer to monitor the inspection. A list of international scientists and laboratories qualified to investigate chemical or biological warfare should be established by the Executive Council. The investigating team should include a specialist in interviewing techniques and someone knowledgeable about the cultural characteristics of alleged victims and witnesses.

C60(A85)

C60(A85)

Proposal Abstract C60(A85)

1. Arms Control Problem:

Chemical and biological weapons - use - "yellow rain"
- destruction of stocks
- destruction of facilities
- production
- stockpiling

2. Verification Type:

(a) On-site inspection - selective
(b) Complaints procedure - consultation and cooperation
- referral to Security Council

3. Source:

Cleminson, F.R. "Verification of Compliance in the Areas of Biological and Chemical Warfare". In Verification and Arms Control, pp. 125-133. Edited by William C. Potter. Lexington, Mass.: D.C. Heath and Company, 1985.

4. Summary:

This article briefly examines past efforts to control and limit chemical and biological weapons and evaluates current negotiations on a chemical weapons convention and their prospects for success. The author comments that the verification provisions of the 1972 Biological Weapons Treaty (see abstract 012(T72)) are ineffective. Under Article 5, parties agree to consult and cooperate, but in 1979 the Soviet Union refused to discuss an outbreak of anthrax in Sverdlovsk which was alleged to have been caused by a mishap at a biological weapons facility. The United States chose not to lodge a complaint with the Security Council, as permitted under Article 6, but maintained that the treaty had not been fully observed.

Negotiations in the Committee on Disarmament (CD) in 1983 brought the US and USSR "appreciably closer". This was manifested in a mutual willingness to consider the possibility of systematic international on-site inspection. This progress was furthered by the January 10, 1984 Soviet proposal on a chemical weapons free zone in Europe and an American statement of intent to table a draft convention on chemical weapons early in 1984. While there are some positive aspects of the Soviet proposal, particularly Soviet interest in chemical weapons and a willingness to discuss verification "as necessary", the draft does not refer to the need for a declaration of existing stocks with adequate verification including on-site inspection. The Soviets would also be allowed to retain their chemical weapons stockpiles east of the Urals which could easily be shifted to circumvent an agreement.

The author responds to critics of the American draft convention on chemical weapons tabled in the CD in April 1984 (see CD/500,

abstract C79(G84). Although the verification and compliance provisions (Articles VIII, IX, X and XI) are stringent, they are only components of a first draft designed to provide an acceptable level of confidence. Furthermore, the United States has repeatedly stressed that the provisions are negotiable. The submission of a parallel draft treaty by the Soviet Union could serve to advance negotiations.

An encouraging example of verification in practice is the UN investigation of alleged use of 'yellow rain' in Southeast Asia. The United Nations managed to establish an international group of experts to conduct inspections and this can be viewed as "the embryo stage of the development of an international verification capability" (p. 130). However, further development of this capability is dependent upon the willingness of countries to accept international inspection. The Soviet Union ignored many UN resolutions calling for investigations of alleged chemical weapon use, but then could not call upon an international verification mechanism to investigate charges that South Africa had, with American backing, bombed a southern city with highly toxic nerve gas in January 1984.

The development and elaboration of verification provisions for a chemical weapons convention have reached the point that destruction of stocks and production facilities can be verified effectively. However, verification techniques for monitoring the non-production of chemical weapons have yet to be proven effective. If negotiation of a comprehensive draft treaty is not possible, it might be worthwhile to break the subject into two treaties, one on destruction of stocks and facilities and one on non-production of chemical weapons.

C61(A85)

C61(A85)

Proposal Abstract C61(A85)

1. Arms Control Problem:

Chemical and biological weapons - use - "yellow rain"

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

Pringle, Peter. "Political Science". The Atlantic Monthly 256, no.4 (October 1985): 67-81.

4. Summary:

In reviewing the history of the Reagan Administration's efforts to obtain proof to verify the use of chemical weapons in southeast Asia and Afghanistan, Pringle maintains that the government's inquiry involved "a continual use of untenable assertions, tendentious logic, omissions, inconsistencies and flawed methodology" (p.79). The government successfully used "shoddy evidence", however, to score a "propaganda coup" for a number of reasons. First, the American public was concerned about the possibility of mass human suffering and was, therefore, more receptive to refugee reports and willing to accept lower standards of evidence than might otherwise have been the case. Second, Soviet assertions that American herbicides used in Vietnam had artificially seeded elephant grass which provided a breeding ground for toxin-producing fungi were greeted with skepticism in the West. The third reason was that the technical complexity of the science relevant to trichothecenes (discovered in some samples of 'yellow rain') lent itself to manipulation.

Pringle notes that, in 1981, an independent analyst, Chester Mirocha, at the University of Minnesota, found three different trichothecenes (toxic agents which can cause internal bleeding in animals and humans) in a sample of 'yellow rain' said to have been taken from a battlefield in Kampuchea within twenty- four hours of a chemical attack. These positive results were not repeated in analysis of other samples, however, and Pringle faults the government for breaking the fundamental rule of scientific inquiry that results must be reproducible.

Pringle recounts how Matthew Meselson, a Harvard biochemist, developed his theory that alleged samples of 'yellow rain' were, in fact, bee droppings because they contained pollen (see abstract C62(A85)). This theory has been supported by much confirming evidence, but still does not answer some important questions. In particular, there is still no explanation as to why Mirocha discovered trichothecenes in the sample he analyzed. A number of explanations have been suggested. One is that a fungus had infested bee feces and

produced trichothecenes. This still does not explain why poisons were discovered in blood and urine samples from alleged victims since people do not intentionally eat bee feces. Another explanation is that people ate moldy grain which is often connected with trichothecenes. Meselson has suggested the possibility that Mirocha obtained false readings or that the samples were contaminated on the way to his laboratory or even once inside the lab.

New explanations have been offered to account for victims of alleged chemical warfare. American-made canisters containing CS, a non-lethal riot-control gas, which were probably left behind in Vietnam, and Czech-produced harassing agent munitions have apparently been discovered on Southeast Asian battlefields. Prolonged exposure to riot-control agents can cause permanent lung damage and death, particularly among infants, ill persons and the aged, who are frequently among the reported victims of yellow rain. However, verification of this cause of death is problematic because, according to published evidence, no Western doctor has seen or examined the body of an alleged victim of a chemical attack.

The American government continues to assert that the fungal poisons discovered by Mirocha came from a chemical warfare agent. However, Pringle reports that, in private, officials have been "retreating" from this confident assertion.

In support of an alternative explanation, the authors conducted many tests. Electron micrograph scans of a sample of 'yellow rain' reveal a structure similar to that of pollen from the feces of the honeybee Apis dorsata, commonly found in Asia. Investigation of the behaviour of these bees revealed that they build as many as 100 nests in a tree and make periodic cleansing flights which leave a swath of yellow fecal spots on vegetation and rocks. Interviews with Hmong refugees in Laos demonstrated that some of the Hmong identify actual bee feces as the alleged chemical warfare agent while others were

unable to identify the bee feces (and hence evidence of 'yellow rain') at all. This evidence supported the authors' hypothesis that evidence of 'yellow rain' is in fact bee feces, but it still cannot be proved that some kind of chemical warfare has not been used.

C63(A58)

C63(A58)

Proposal Abstract C63(A58)

1. Arms Control Problem:

- Biological weapons - production
- research and development

2. Verification Type:

- (a) On-site inspection - selective
- (b) Records monitoring - personnel

3. Source:

Groupe, V. "On the Feasibility of Control of Biological Warfare". In Inspection for Disarmament, pp. 185-191. Edited by S. Melman. New York: Columbia University Press, 1958.

4. Summary:

This proposal involves two related but distinct parts. First, each party to the control agreement would maintain a registry of the location of certain large and essential pieces of laboratory and pilot plant equipment. A registry of qualified bacteriologists and other professional specialists and their current assignments or location of employment would also be kept.

Second, inspection teams composed of military intelligence experts, and some bacteriologists would inspect facilities known to produce bacteriological weapons, as well as certain other facilities connected with their production. An international science advisory board could serve in a consultative capacity.

C64(A83)

C64(A83)

Proposal Abstract C64(A83)

1. Arms Control Problem:

- (a) Biological weapons - production
- (b) Chemical weapons - use

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors - satellite

3. Source:

Towle, Philip. "The Soviet Union and the Biological Weapons Convention". In The Verification of Arms Control Agreements, pp. 31-40. Edited by Ian Bellany and Coit D. Blacker. London: Frank Cass, 1983.

See also: - Robinson, J.P. Perry. "Discussion of 'The Soviet Union and the Biological Weapons Convention' and Guide to Sources on the Sverdlovsk Incident". In The Verification of Arms Control Agreements, pp. 41-56. Edited by Ian Bellany and Coit D. Blacker. London: Frank Cass, 1983 (see abstract M16(A83)).

4. Summary:

There have been allegations of a Soviet violation of the Biological Weapons Convention (ratified by the United States and Soviet Union in 1975) connected with an outbreak of anthrax in Sverdlovsk in 1979. Unconfirmed and confused reports in the Western media suggested that the source of the epidemic may have been an explosion in a biological weapons factory. The Soviet Union claimed that the cases of anthrax were of the gastric rather than the pulmonary type and were caused by mishandling of contaminated beef. The author points out that only uncertain conclusions can be drawn from the unclear evidence available. Nonetheless, he asserts that the Soviet explanation "whilst not absolutely impossible, is highly unlikely because of the timing, the location and the nature of the victims of the disease" (p.34).

Verification of the Biological Weapons Convention is difficult. Satellite identification of biological weapons factories is not foolproof and reports from dissidents must be viewed skeptically. The author maintains that the Soviet Union missed an opportunity to refute allegations conclusively by opening six alleged biological weapons facilities to international inspection. Soviet reluctance to do this is not necessarily indicative of guilt, but they could have "disguised" inspection by inviting Western scientists to visit the factories to attend symposia or on another pretext. Such an approach could have dispelled concern about setting a precedent for future intrusive inspections by keeping the activity quiet.

There have also be in conclusive results in studies of the use of chemical weapons in Southeast Asia and Afghanistan conducted by a specially established UN Group of Experts. This emphasizes the difficulty in verifying certain arms control agreements such as the Biological Weapons Convention. In this context, the author argues, the West should not denounce the existing agreement, but should continue with efforts to effectively verify it through measures such as UN investigations.

C65(A79)

C65(A79)

Proposal Abstract C65(A79)

1. **Arms Control Problem:**

- Chemical weapons - destruction of facilities
- destruction of stocks
- production
- stockpiling

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Records monitoring - economic
- (c) Short-range sensors - sampling
- (d) Remote sensors - satellites
- (e) International control organization

3. **Source:**

United Kingdom. Foreign and Commonwealth Office. Arms Control and Disarmament Research Unit. "Verification of a convention on chemical weapons". March 1979. (Note: This paper is a research study only and does not necessarily reflect the views of the government of the United Kingdom).

4. **Summary:**

The paper evaluates several proposed methods for verifying a CW convention. Regarding the creation of elaborate international control organizations to conduct inspections, problems will arise over costs and fears of espionage. Such considerations suggest that a simpler form of control body would be more acceptable in the short term. One possibility is a control committee which would meet regularly or as required and appoint scientists to carry out particular inspections. If a more permanent inspectorate is ever needed than this committee could be modified accordingly. Ideally no state should be able to block the committee from acting. Inspections of civilian plants would have to be carefully conducted by chemical industry experts. Inspections must be prompt once suspicions are aroused.

Verifying a CW ban by monitoring published statistics about civilian chemical production would be of limited efficiency. Problem would arise in large industrialized countries where amounts produced are great and chances for diversion numerous. Even concentrating the monitoring on specific chemicals and specific factories would be of limited value unless there were inspections to verify the accuracy of the statistics. The possibility of evasion would still exist, however.

Effluent sampling (gaseous and liquid) might be a reliable additional form of verification despite some problems. Samples taken close to a civilian chemical plant might indicate the presence of suspicious chemicals. But the absence of such traces is unlikely itself to give sufficient confidence that no evasion has occurred so as to make other forms of verification unnecessary.

Inspection of the chemicals entering a plant as raw materials could be a useful indicator of production of illegal CWs. The presence of certain kinds of machinery could also indicate evasions, though this must not be overestimated as a verification method because legitimate production processes may involve similar equipment. An exception is filling equipment for CW munitions which is quite distinctive. The presence of special safety precautions would mean that the facility would have to be kept under regular surveillance but it would not be positive proof of evasion.

Complete demolition of a CW production facility could be verified by satellite. However, partial dismantling or decommissioning would require inspection. Tamper-proof seals could be used but regular checks would still be needed. Conversion of a CW facility to civilian use would require a rigorous form of international inspection involving continual and regular visits.

To monitor destruction of CW stocks at least some test of the type of chemical being destroyed (to show that they are not pesticides for example) is necessary as well as some indication of the quantity being destroyed.

Locating hidden CW plants is a very difficult verification problem, particularly in advanced countries with tight internal political restraints. Random air and water sampling is unlikely to be useful in a large country. Detection by satellite would be very difficult if the clandestine plant was part of a large industrial complex. Satellites, also, are available only to a few countries and any verification system depending on them would be fundamentally discriminatory. The most likely way of detecting hidden plants remains traditional intelligence methods. Similarly there is no way hidden stockpiles can be located except by traditional means of intelligence. Once located inspection would be essential to allay suspicions. Refusal to allow inspection could be taken as proof of guilt. If national means of detection alone are relied upon then a country would have no other choice but to ignore its suspicions or denounce the treaty.

C66(G79)

C66(G79)

Proposal Abstract C66(G79)

1. **Arms Control Problem:**

- Chemical weapons - destruction of facilities
- destruction of stocks
- production

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) International exchange of information

3. **Source:**

France. CD/PV.43, 19 July 1979.

4. **Summary:**

In outlining the preliminary views of France on a CW convention, the French delegate stated that the treaty should require each signatory to furnish a detailed qualitative and quantitative inventory of toxic substances and a provisional time-table for their destruction. A similar detailed inventory should be required for the destruction or conversion of CW production plants.

For France, verification is a crucial aspect of the convention though it raises the most difficult question. It is indispensable that verification be of an international character.

On-site verification of chemical disarmament is technically feasible and should be employed to ensure the observance of the production ban on specifically military agents and munitions, the observance of destruction timetables, and the control of the products of laboratories still authorized to conduct research for passive CW protection.

Verification of precursors and verification of dual-purpose substances are difficult problems substantially different from verification of substances specifically for military use. An answer to this problem has been found within the Arms Control Agency of the Western European Union which might serve as a precedent.

C67(G79)

C67(G79)

Proposal Abstract C67(G79)

1. **Arms Control Problem:**
Chemical weapons - destruction of facilities
2. **Verification Type:**
On-site inspection - selective
3. **Source:**
United Kingdom. "Visit to Britain by chemical weapons experts (14-16 March 1979)". CD/15, 24 April 1979.
See also: - CD/PV.29, 24 April 1979.

4. **Summary:**

The UK working paper is a brief summary of a visit by the representatives of several governments to two sites in Great Britain: a former nerve agent plant that is in the process of demolition and a civil chemical factory. The paper gives some conclusions based on British experience regarding the tasks and problem which must be faced in demolition of a CW plant.

One of the conclusions reached is the on-site inspection of the type demonstrated in the UK visit can establish that a plant has been removed and that equipment has been destroyed. It can also show that a facility has been completely immobilized through removal or dismantling of the essential ancillary elements of a toxic plant, namely the means for totally enclosing the plant and the systems for ventilating the exhaust air through cleaning/detoxification equipment.

C68(A80)

C68(A80)

Proposal Abstract C68(A80)

1. **Arms Control Problem:**

Chemical weapons - destruction of facilities

2. **Verification Type:**

- (a) On-site inspection - selective
 - obligatory
- (b) Remote sensors - satellite
- (c) Short-range sensors - monitoring devices
 - sampling
 - seals

3. **Source:**

Roberts, R.E. "Verification Problems - Monitoring of Conversion and Destruction of Chemical-Warfare Agent Plants". In Stockholm International Peace Research Institute, Chemical Weapons: Destruction and Conversion, pp.129-138. London: Taylor and Francis, 1980.

4. **Summary:**

The author believes that verification provisions are needed because of the absence of mutual trust between nations. Verification procedures can provide a vehicle for increasing this trust.

The discussion assumes that existing CW plants will be declared as part of a treaty which bans production. It examines several possible destruction and conversion scenarios.

Conversion situation:

- (1) Dual-purpose agents: The problem here is to distinguish between military and civilian production. An absolute answer can only be provided by monitoring production, transportation and consumption which involves detailed reporting of activities and on-site access.
- (2) Single-purpose agents: Facilities which produce this category of CW agent could be readily employed to manufacture civilian products and just as readily re-employed to produce CW agents. The most likely civilian products produced by converted CW agent plants are plasticizers and pesticides. Because of the ease of reconversion stringent verification would be needed including frequent on-site inspections. During the initial inspection it would be important to determine if conversion was actually taking place or whether a parallel production stream was being installed. The inspectors, through a review of blue-prints and other documentation plus actual physical inspection of the plant, would determine the time required to reconvert the facility to produce CW agents which would in turn determine the frequency of follow-on visits. This frequency would probably be measured in days or, at best, a week or so. The high level of intrusion

necessary for verification and the limited economic incentive for conversion suggest that shut-down of the plant would be a preferable alternative.

Destruction:

The following discussion focusses on two verification issues - confirming that declared plants are in fact producing CW agents and verifying the plants inactivity once deactivated. Guidelines employed in developing the following procedures were that they should be as simple and non-intrusive as is consistent with verification requirements.

- (1) Determining whether a declared facility was designed for CW agent production:

Assuming the plant is inactive, it is necessary to look for the presence of:

- (a) necessary chemical processing units,
- (b) appropriate safety features, and
- (c) special waste-treatment equipment.

These determinations require on-site access by a specially prepared chemical processing engineer. If no documentation about the plant's processes is provided, a skilled inspector could determine that a highly toxic material was being produced but not the particular substance. If such documentation is given, then the particular agent could be specified with high reliability. No elaborate verification equipment is required. The length of time the inspector is on the site would vary from perhaps a week (when no documentation is provided) to half that time (when documentation is provided).

- (2) Determining whether a facility had in fact been used to produce CW agents:

In addition to the steps outlined in the foregoing section, evidence of the agent or its degradation products must be obtained by collecting samples from the site and analyzing them. To avoid the possibility of "seeding" to give a false finding, samples should be obtained from a number of points within the perimeter of the plant. No elaborate equipment is needed for taking or transporting the samples, but the chemical analysis would require sophisticated equipment.

- (3) Determining that the facility has been dismantled and cannot readily be reassembled:

Verification here is two step - confirming that the dismantling is sufficient to prevent reassembly in a short time, and continued monitoring to ensure reassembly does not occur. Generally, the greater the dismantling, the less frequent and intrusive the continued monitoring need be. On-site inspection, however, is required to assess the reversibility of the dismantling. For extensive dismantling, it is possible that the continued monitoring could be carried out by satellite together with provision for on-site visits on a challenge basis. In the case of less extensive dismantling which might permit reactivation in a period of weeks, satellite observation should be augmented by the installation of tamper-indicating seals on

critical equipment in the plant. Temperature-sensitive monitors, seismic devices and pre-programmed cameras could also be used. Readings from these sensors could be transmitted via existing communications satellites or obtained during periodic maintenance visits by inspectors to the plants. Such visits would occur every four to six months.

The intrusiveness of the continued monitoring could be reduced by permitting inspectors to suggest further dismantling steps. Such an approach would require two initial site visits - one to check the degree of dismantling and to recommend other measures and the other to check that recommended steps had been taken. After that satellite observation would suffice to ensure the plant was not reassembled.

- (4) Confirming that a CW plant had been moth-balled and cannot be reactivated clandestinely:

The verification procedure is essentially the same as for the previous situation except that, since the plant is being preserved intact, the time required to reactivate it is inherently shorter. Two initial visits would be needed - the first to assess the state of moth-balling and to determine what on-site sensors are needed and their location; the second to install the sensors. The combined duration of these two visits could range from two weeks to a month since there will be a detailed engineering analysis and construction effort involved.

Satellite observation is moderately adequate for the continued monitoring phase but two factors argue against remote monitoring. First, maintaining the plant in a stand-by condition requires that some of the equipment be operated periodically to prevent deterioration. Second, since continued maintenance of the plant is necessary, it becomes difficult to differentiate from a distance between maintenance activities and a clandestine production run.

The type of sensors and their maintenance requirements would be similar to those for the preceding section, as would be the need for some on-site inspection by challenge procedure.

C69(G81)

C69(G81)

Proposal Abstract C69(G81)

1. Arms Control Problem:

- Chemical weapons - destruction of facilities
- destruction of stocks
- production
- research and development
- stockpiling
- use

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
- (b) Complaints procedure - consultative committee
- (c) National self-supervision
- (d) International control organization
- (e) International exchange of information
- (f) Short-range sensors - sampling
- (g) Remote sensors - satellite
 - sampling

3. Source:

Canada. "Verification and control requirements for a chemical arms control treaty based on an analysis of activities". CD/167, 26 March 1981.

4. Summary:

The Canadian paper attempts to review the technical verification requirements for each basic activity to be included in a CW treaty in the hope that this will ensure that technical verification difficulties will not stand in way of agreement.

- (1) Declarations of existing CW production facilities: Remote sensors such as satellites available to the superpowers might provide confirmation of such declarations. To provide minimum confirmation to all nations some on-site visits would be necessary. Both national and international personnel (non-technical) would be used. One declared site could be inspected at random though visits to all declared sites would be desirable. Sensitive site or process information would not be revealed.
- (2) Declarations of existing CW stocks: Verification requirements would be the same as for declared production sites. Deliberate non-declaration of sites (production or stockpiles) could not be detected by any technical methods including inspection though "national technical means" might reveal some cover-ups which would then require a challenge mechanism.

- (3) Dismantling production facilities: It may be possible to observe dismantling by satellite but not with other remote sensors. Satisfactory international verification can only be achieved by on-site visits. At a minimum one site could be inspected at random by a combined national and international (non-technical) team at the end of the five year destruction period. Inspection once a year would be more desirable but not essential. No chemical sampling would be needed.
- (4) Destruction of stocks; One approach would be "non-verification" perhaps involving invited inspection by international personnel. If this was unacceptable more intrusive verification would be needed. Monitoring of the process must be virtually continuous with periodic spot sampling and analysis by inspection teams which would include some international personnel.
- (5) Development of CWs: Atmospheric testing could be detected by remote means but the use of remote detection by an international body would be tantamount to an accusation and would be very expensive. The only feasible international activities would be in response to challenge mechanisms. National control agencies would do the routine monitoring.
- (6) Construction or conversion of new production facilities: These may be monitored by the national control bodies but routine international verification is not feasible. It would be used only in response to challenge mechanisms.
- (7) Production of CWs: This is key problem. Routine monitoring of chemical plants in all nations including inspections might be feasible for national control agencies, but would be beyond the capabilities of an international agency without a large number of inspectors. Satisfactory minimum international assurance might be provided by a structured information exchange and response to challenge mechanisms. On-site challenge inspections would require chemical sampling. Routine inspections and reporting would be conducted by national control bodies.
- (8) Retention of stocks: International measures are limited to challenge mechanisms.
- (9) Offensive military training: International monitoring is limited to informal exchanges and responses to challenges.
- (10) Use of CWs: Reports of CW use would be carefully weighed by the international community and, if found substantial, the nation involved would be requested to allow the taking of samples from the site by international inspectors within 48 hours of an event.

Each signatory of the treaty would be required to maintain a national verification group either as a separate body or as part of an existing government agency. It would be responsible for all routine monitoring required by the agreement and for providing data to the international control body. It would also make arrangements for all on-site inspections and chemical sampling.

The international verification measures would not involve a level of employment requiring a permanent staff in any international agency. Each party could nominate one technical and non-technical inspector for use on a stand-by basis. The international verification

agency need only consist of a supervisory (consultative) committee at a political level which would meet periodically or on request, supported by a small secretariat. The committee would determine the verification measures to be undertaken while the secretariat would provide for routine measures.

Much of the verification emphasis will be placed on challenge mechanisms and these must be specified in detail in the treaty.

5. Selected Comments of States:

The German Democratic Republic (CD/PV.165, 23 March 1982) comments that the document offers a useful analysis of the pros and cons of various verification methods and demonstrates the merits of a verification system which combines national self-supervision, remote sensing by national technical means and a complaints procedure involving a consultative committee.

The United States of America (CD/PV.166, 25 March 1982) views the document as "a good starting point for drawing up a list of issues to be addressed".

The Union of Soviet Socialist Republics (CD/PV.178, 12 August 1982) praised the document particularly for recommending that the starting point of verification should be minimum levels of intrusiveness in the internal affairs of states.

The Soviet Union introduced these proposals as an example of the readiness of the USSR to start developing procedures for destroying the relevant industrial base as expressed in the statement of M.S. Gorbachev on 15 January.

C70(G74)

C70(G74)

Proposal Abstract C70(G74)

1. Arms Control Problem:

Chemical weapons - destruction of stocks

2. Verification Type:

- (a) On-site inspection - selective
- (b) Short-range sensors - monitoring devices
- sampling

3. Source;

United States. "Working paper on chemical agent destruction". CCD/436, 16 July 1974.

4. Summary:

The paper describes the process of actual destruction of mustard agents in the US. It also discusses possible verification methods for monitoring destruction of these agents and perhaps others. Verification of destruction can be conducted in a variety of ways depending on the access accorded verification personnel. The degree of access varies from remote observation through closed circuit TV to free access and sampling. Verification can be undertaken at several stages in the process of destruction.

- (1) Transfer of Agent Containers, Unloading and Thawing: The most recognizable indicators at this stage are:
 - (a) availability of decontamination equipment,
 - (b) protective clothing and masks of workers,
 - (c) warning signs, and
 - (d) security measures.

These could be easily observed but also easily staged and thus are of questionable verification value.

- (2) Draining Containers:

This step provides the first opportunity for positive assurance that a toxic chemical is present, but full access for sampling is needed.

- (3) Incineration of Agent;

Verification at this stage provides the best assurance that a toxic agent is being destroyed. Sampling would occur just before the substance enters the furnace. Specimens of the salts resulting from incineration of the mustard agents could also prove useful. A third verification method might be to try to obtain a materials balance (i.e. the quantity of materials going in compared to amount coming out). For this method the system would have to be totally contained to prevent any loss of materials.

- (4) Scrubbing of Effluent Gases, Disposal of Salts, Decontamination and Disposal of Containers: These steps do not seem to provide any important additional opportunities for verification.

C71(G76)

C71(G76)

Proposal Abstract C71(G76)

1. **Arms Control Problem:**

Chemical weapons - destruction of stocks

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Short-range sensors - sampling

3. **Source:**

Sweden. "Working paper on some aspects of on-site verification of the destruction of stockpiles of CWs". CCD/485, 9 April 1976.

See also: CCD/PV.704, 22 April 1976.

4. **Summary:**

Fears have been expressed that observation of destruction of CW stocks could be used to acquire military and industrial secrets.* Sweden proposes to alleviate this concern through the use of chemical tests which would determine the toxicity of the substance being destroyed but which would not disclose the chemical nature of the substance.

The paper suggests the specimens be taken from the surroundings of the destruction site and analyzed in order to determine the toxicity of substances being destroyed. This "perimeter sampling" would be less intrusive than other methods. The analyses could be carried out in off-site laboratories or by "black boxes" on the site. The obvious drawback, the paper points out, is that no estimation can be made of the amount of agent being destroyed using this technique. However, chemical analysis of "perimeter" samples combined with toxicity tests of random samples of the agent might result in a fairly good assessment of the type of substance and the amounts being destroyed.

* See for example: USSR, CCD/PV.647, 30 July 1974.

C72(G76)

C72(G76)

Proposal Abstract C72(G76)

1. **Arms Control Problem:**

Chemical weapons - destruction of stocks

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Short-range sensors - monitoring devices
 - sampling
 - seals

3. **Source:**

United States. "Verification of destruction of declared stocks of CW agents". CCD/497, 29 June 1976.

4. **Summary:**

The American paper continues the evaluation of possible verification methods for monitoring CW agent destruction, first discussed in CCD/436 (see abstract C70(G74)). The paper commences by stating two assumptions:

- (1) the destruction is done thermally or chemically, and
- (2) the disposal facility is similar to that described in CCD/436.

Planning of the observation must be worked out cooperatively between the facility management and the observers. Before destruction begins observers would be given engineering drawings and a detailed technical description of the destruction process. They would then confirm this information by inspecting the plant to make certain that no diversion of the agent was possible. Periodic re-inspections would be necessary, to ensure that no illegal modifications to the facility had occurred.

The observers would be authorized to visit any area of the facility at any time to observe all activities. In addition, surveillance of certain areas could be done remotely using cameras and TV. Tamper-resistant seals might also be used to close off certain areas of machinery.

Verifying the quantity of agent destroyed might be done by monitoring the rate of flow into the destruction chamber. Verifying the nature of the agent might be done by toxicity tests and chemical analysis of samples taken periodically, and by monitoring waste products. Air sampling, a less intrusive technique, might be of assistance but it could not replace sampling of the agent stream.

The use of a tracer substance added to the agent stream might help ensure there was no diversion. In this regard another useful method, if the identity of the agent were known, might be the use of a material balance calculation to compare the amount of the waste products with the amount of agent entering the process. Finally, the observers would have their own technical facilities on the site.

C73(G77)

C73(G77)

Proposal Abstract C73(G77)

1. **Arms Control Problem:**

Chemical weapons - destruction of stocks

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Short-range sensors - sampling

3. **Source:**

Union of Soviet Socialist Republics. "Verification of the destruction of declared stocks of chemical weapons". CCD/539. 3 August 1977.

4. **Summary:**

The main purpose of monitoring the destruction of declared stocks of CWs should be to establish and report:

- (1) the fact of the destruction of an agent of a certain type,
- (2) the quantity of the agent destroyed, and
- (3) the quality of the agent.

This paper is intended to described one method for attaining these objectives.

The paper is based on the assumption that the destruction process will be under national control. As well, it is assumed that:

- (1) the chemical agents are destroyed by incineration or detoxification;
- (2) the planning of the destruction, removal of the agent from containers or warheads, and collection in special receptacles, are regarded as preparatory operations which are taken without the participation of controllers; and
- (3) the agents are transported to the place of destruction in special receptacles.

Quantity of the agent is determined by weighing it or measuring its volume. As well, the density of the agent must be ascertained. The quality of the agent is determined by the "content, in percent, of the basic substance of the agent". The working paper provides formulae for calculating these figures and examples of the application of these formulae.

Since it is possible that the chemical agent may be non-homogeneous in quality, it is necessary to analyze at least three samples - one at the beginning of the destruction process, one in the middle, and one at the end. The samples can be taken either directly from the receptacle or from the flow of the substance when it is being fed into the destruction facility. The final stage of laboratory chemical analysis should be the analysis of the extent of decomposition of the chemical agents destroyed.

C74(A80)

C74(A80)

Proposal Abstract C74(A80)

1. Arms Control Problem:

Chemical weapons - destruction of stocks

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors

3. Source:

Ooms, A.J.J. "Verification of the Destruction of Stockpiles of Chemical Weapons". In Stockholm International Peace Research Institute, Chemical Weapons: Destruction and Conversion, pp.123-128. London: Taylor and Francis, 1980.

4. Summary:

There are three components to verifying the destruction of CW agent stockpiles:

- (1) the size of the stockpile,
- (2) the percentage of stockpile to be destroyed and the rate of destruction, and
- (3) the possibility of confirming the rate of destruction.

The answer to problem 1 can only be gathered by intelligence work - satellite observation, estimates of the size of the chemical industry of a state, etc. If, as is likely, the stockpile is probably distributed over a small number of well-protected sites as are tactical nuclear weapons, a reasonable guess of at least the order of magnitude of the stockpile can be made.

As for the second problem, the more closely the quantities of the stockpile destroyed approach the total estimated size of the stockpile, the higher will be confidence that the stocks are being destroyed.

The third issue is crucial. Destruction carried out at multi-national regional destruction sites is the most easily verifiable. On-site inspection at mutual destruction sites may generate a great deal of confidence. Great care will need to be taken to safeguard military and industrial secrets but several examples of existing safeguards procedures show that this problem is not insurmountable.

- (1) Notification and justification of the type and quantity of chemical;
- (2) Recording the use of the chemical;
- (3) Notification of the transfer of agreed amounts to another state;

- (4) Inspection of the facility if production levels exceeded a specified small amount; and
- (5) The possibility of challenge inspection.

A secretariat would be established to coordinate the work of inspectors and conduct the work of the consultative committee on a daily basis. Further discussion is necessary to decide whether inspectors should work out of a centralized laboratory facility or whether they should have access to national laboratories.

C76(G84)

C76(G84)

Proposed Abstract C76(G84)

1. Arms Control Problem:

- Chemical weapons - destruction of stocks
 - destruction of facilities
 - stockpiling
 - production
 - use

2. Verification Type:

- (a) On-site inspection - selective
 - challenge
- (b) Remote sensors
- (c) International control organization
- (d) International exchange of information
- (e) Complaints procedure - consultative committee
 - referral to United Nations

3. Source:

China. "Proposals on major elements of a future convention on the complete prohibition and total destruction of chemical weapons". CD/443, 9 March 1984.

4. Summary:

The verification provisions of this proposed convention to prohibit the production and use of chemical weapons emphasize international on-site inspection. Different measures of verification for different purposes would include continuous on-site inspection, routine periodical or random on-site inspection and on-site inspection by challenge. States should "respond in a positive manner to requests for challenge inspection authorized by the Consultative Committee". States would also share information on the implementation of the convention acquired through national technical means of verification.

A Consultative Committee would administer routine and challenge inspections and would examine complaints of non-compliance with the convention. Complaints regarding non-compliance would be submitted to a Standing Committee of the Consultative Committee with supporting evidence. The Standing Committee would first encourage the parties to resolve the dispute through bilateral or multilateral discussions, but, if no solution is reached, a plenary meeting of the Consultative Committee would be convened within a month to consider the matter. The Consultative Committee would decide upon measures of verification, including on-site inspection, to be taken to establish the facts. A party may refuse a request for verification, but should provide an explanation. If the Consultative Committee is unsatisfied with the explanation, the challenged party "shall be obliged to subject itself to verification". Disputes may be referred to appropriate United Nations bodies.

C77(G84)

C77(G84)

Proposal Abstract C77(G84)

1. Arms Control Problem:

Chemical weapons - destruction of stocks
- destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
- (b) Short-range sensors
- (c) International exchange of information - declarations

3. Source:

France. "Elimination of stocks and of production facilities".
CD/494, 3 April 1984.

4. Summary:

This paper proposes that each party to a chemical weapons convention make a declaration within thirty days after the entry into force of the convention of possession or non-possession of stocks, existence or non-existence of production facilities (with location, nature and manufacturing capacity of any production plant or filling facility) and propose a plan for their destruction which includes international means of on-site verification. International on-site inspection of stocks within three months of the declaration would place the stocks under international surveillance using sensing instruments which would be read periodically.

France favours grouping stocks on destruction sites rather than declaring the location of stocks. On-site inspections and short-range sensors would also verify the closure of production facilities after the initial declaration and after each destruction operation. Further systematic on-site inspections and checks of the sensing instruments at regular intervals would verify the closure.

C78(G84)

C78(G84)

Proposal Abstract C78(G84)

1. **Arms Control Problem:**

- Chemical weapons - destruction of stocks
- destruction of facilities
- production

2. **Verification Type:**

- (a) On-site inspection - selective
 - challenge
 - sampling
- (b) International control organization

3. **Source:**

The Netherlands. "Size and structure of a chemical disarmament inspectorate". CD/445, 7 March 1984.

4. **Summary:**

This paper assumes that a chemical weapons (CW) Convention would establish a Consultative Committee, composed of representatives of parties to the convention and assisted by a Technical Secretariat of inspectors and support staff with the function of monitoring implementation of the convention. Verification procedures proposed in the paper consist of three types of on-site inspection:

- (1) systematic continuous inspections at destruction facilities;
- (2) (a) systematic, non-continuous regular inspections at CW plants during destruction, CW stockpiles prior to destruction and facilities producing small amounts of CW agents for protective purposes;
- (b) systematic, non-continuous random inspections at CW plants producing super-toxic lethal chemicals for permitted purposes or plants synthesizing organic chemicals in large quantities; and
- (3) ad hoc ("challenge") inspections.

Systematic random inspections would probably be most effective, because non-compliance would be deterred by the possibility that a plant could be inspected again even if it had been inspected the day before. Ad hoc inspections would be initiated by the Consultative Committee after discussion of information related to possible violations of a convention.

The paper discusses the requirements for establishing an inspectorate. The paper concludes that about 50 inspectors and 90 supporting staff would be needed permanently to monitor compliance with a chemical weapons convention. Approximately 75 to 115 inspectors and about 100 or less supporting staff would be needed during the first 10 years in which the convention is in force. An inspectorate would use inspectors with broad experience in the civilian chemical industry. No estimate of costs for the establishment and operation of an inspectorate is provided.

C79(G84)

C79(G84)

Proposal Abstract C79(G84)

1. Arms Control Problem:

- Chemical weapons - destruction of stocks
- destruction of facilities
- production
- use

2. Verification Type:

- (a) On-site inspection - selective
- obligatory
- (b) Short-range sensors
- (c) Remote sensors - national technical means
- (d) International control organization
- (e) International exchange of information - declarations
- (f) Review conferences
- (g) Complaints procedure - consultation and cooperation
- consultative committee
- referral to Security Council

3. Source:

United States of America. "Draft convention on the prohibition of chemical weapons". CD/500, 18 April 1984.

See also: - "The declaration and interim monitoring of chemical weapons stockpiles". CD/516, 13 July 1984.

- CD/PV.260, 18 April 1984.
- CD/PV.272, 12 July 1984.
- CD/PV.274, 19 July 1984.
- "Amendment to CD/500, draft convention on the prohibition of chemical weapons". CD/685, 3 April 1986.

4. Summary:

This document is a draft convention of a comprehensive ban on the production and use of chemical weapons. After a preamble, in Articles 1-6, the convention covers the basic prohibition, definitions, permitted activities and declaration and destruction of chemical weapons and production facilities. Articles 7-12 address verification and implementation measures and Articles 13-18 deal with assisting parties endangered by chemical weapons and procedural matters such as amendments and ratification. Annex 1 discusses the Consultative Committee in detail, Annex 2 focuses on verification and Annex 3 outlines methods for measuring toxicity of chemicals and provides schedules which list chemicals subject to special measures.

Article 1 prohibits the development, production, acquisition, stockpiling, retention, transfer and use of chemical weapons. It also prohibits states from conducting "other activities in preparation for use of chemical weapons".

The verification provisions of this draft convention consist of international on-site verification through systematic on-site inspection and monitoring with on-site instruments under the auspices of an international Consultative Committee. Remote sensing by national technical means is mentioned only in Article 8 which provides for non-interference with verification. Details of verification procedures are provided in Annex 2. On-site inspection would cover:

- (1) Inspection and interim monitoring of stocks after declaration,
- (2) Verification of the destruction of chemical weapons,
- (3) Closure, inspection and interim monitoring of production facilities,
- (4) Verification of the destruction of production facilities,
- (5) Monitoring of a single permitted specialized production facility, and
- (6) Chemical production for permitted purposes.

Article 9 discusses procedures for consultation and cooperation between parties to resolve compliance issues. Bilateral consultations and inspections may be supplemented by a request for a fact-finding inquiry addressed to the Executive Council of the Consultative Committee.

Special on-site inspections discussed in Article 10 would examine any location or facility owned or controlled by the government of a party. Within twenty-four hours of receiving notification of a special on-site inspection, "the Party to be inspected shall provide the inspection team unimpeded access to the location or facility". The inspection would be carried out by an inspection team from a technical secretariat. In CD/PV.260, Vice-President George Bush calls this type of verification by inspection "open invitation".

Under Article 11, any party to the convention may request the Consultative Committee to conduct an ad hoc on-site inspection to clarify matters related to compliance. A Fact-Finding Panel subordinate to the Executive Council of the Consultative Committee would then meet within twenty-four hours to determine whether to request an ad hoc inspection. If a request is made, the party to be inspected would, "except for the most exceptional reasons", grant access within twenty-four hours to an inspection team. A refusal would be accompanied by an explanation and "a detailed, concrete proposal for an alternative means of resolving the concerns which gave rise to the request". The Fact-Finding Panel may send another request and if that request is rejected, the Chairman of the Fact-Finding Panel would inform the Security Council of the United Nations.

Special on-site inspections are differentiated from ad hoc inspections by their initiation procedure. Any of the five members of the Fact-Finding Panel (one member each from the United States and Soviet Union and three other members selected for six year terms) may request a special on-site inspection to clarify doubts about compliance or ambiguities. The inspection would then proceed within twenty-four hours. In contrast, any party may request an ad hoc inspection, but the Fact-Finding Panel must first approve it.

The international Consultative Committee (see Article 7 and Annex 1) composed of representatives of parties to the convention would: (a) carry out systematic on-site verification through on-site inspection and monitoring with on-site instruments, (b) conduct special on-site inspections under Article 10 and ad hoc on-site inspections under Article 11, (c) participate in any inspections agreed among two or more parties if requested to do so, (d) review and develop procedures and technical matters related to implementation of the convention, (e) conduct annual meetings and (f) hold periodic review conferences at five year intervals unless otherwise agreed by a majority of parties.

The Fact-Finding Panel (see Annex 1) would be responsible for conducting fact-finding inquiries, considering reports on special on-site inspections and overseeing ad hoc inspections.

Under Article 13, parties would, to the extent they deem "appropriate", assist any party that the Security Council decides has been exposed to danger as a result of a violation of the convention.

In CD/PV.274, the United States delegate responded to statements which suggested that the draft convention discriminates against states with different political and economic systems since Article 10 permits inspections of government-owned or controlled facilities. The delegate stated that facilities controlled by the government included those controlled through contracts. He stated that since the privately-owned chemical industries of the United States are so heavily regulated by the government, they would be considered as being "controlled" by the government and hence subject to the provisions of Article 10.

The amendment outlined in CD/685 is intended to make clear that Article X obligations would apply equally to all states regardless of their economic or governmental system. It deleted the subparagraphs dealing with facilities for which a special on-site inspection may be requested and replaced them with the following:

- (1) Any location or facility subject to systematic international on-site inspection pursuant to Articles III, V and VI;
- (2) Any military location or facility or any other location or facility owned by the government of a party;
- (3) Any type of privately-owned location or facility described below: (The specific wording of this section would be agreed upon in the negotiations. The United States intended that this provision reach any privately-owned location or facility that might be suspected of being used for activities in violation of the convention.)

5. Selected Comments of States:

In general, the Socialist States rejected the draft convention as "unacceptable" while western states were supportive of the general direction the convention is heading in.

Mongolia (CD/PV.262, 26 April 1984) states that the "open invitation" proposal does not respond to the need for a verification system based on mutual interests and the principle of equality and

equal security. The USSR (CD/PV.262, 26 April 1984) rejects the proposal because it is "deliberately unacceptable" for the Soviet Union and many other states. The proposal for unimpeded access of foreign inspectors "anywhere and at anytime" is discriminatory because it would cause damage to the economic and defence interests of a number of states, particularly the socialist states. Czechoslovakia (CD/PV.262, 26 April 1984) also rejects the proposal as "politically naive" and "obviously unacceptable". Poland (CD/PV.275, 24 July 1984) comments that "the intrusiveness of the system proposed by the United States is incommensurable with real needs" and says that American author Louis Henkin suggests that on-site inspection of private industry may even require amendment of the United States Constitution.

The United Kingdom (CD/PV.262, 26 April 1984) supports the need for strict verification including mandatory systematic or permanent international on-site inspection as well as inspections by challenge. The FRG (CD/PV.262, 26 April 1984) welcomes the American willingness to undertake a mutual obligation to open sensitive military installations to international on-site inspection, but expresses concern that verification of non-production should not impose unnecessary burdens on the civilian chemical industry. Canada (CD/PV.262, 26 April 1984) supports in general the stringent verification provisions of the American draft convention and Italy (CD/PV.264, 14 June 1984) likewise supports the proposed verification measures.

C80(A85)

C80(A85)

Proposal Abstract C80(A85)

1. Arms Control Problem:

- Chemical weapons - destruction of stocks
- destruction of facilities
- production
- use

2. Verification Type:

- On-site inspection - selective
- challenge

3. Source:

Goldblat, Jozef. "Chemical Weapons Convention". Bulletin of the Atomic Scientists 41, no.5 (May 1985): 19.

See also: - United States. "Draft convention on the prohibition of chemical weapons". CD/500, 18 April 1984 (see abstract C79(G84)).

4. Summary:

The author maintains that a verification regime without on-site inspection on a challenge basis with twenty-four hours' notice as proposed in CD/500 could still detect large-scale violations of a chemical weapons convention. Routine inspection and automatic monitoring would be adequate verification measures to detect militarily significant violations. Few governments would be likely to grant the "unimpeded access" to any government-owned or controlled facility proposed in CD/500. This type of inspection could also prove to be a burden on the civilian chemical industries of American allies. American industries might also resist such intrusive inspections. The rigorous verification regime proposed by the United States seems unwarranted because only one category of weapons (which are not decisive in warfare anyway) is being banned.

C81(A85)

C81(A85)

Proposal Abstract C81(A85)

1. Arms Control Problem:

- (a) Chemical weapons - destruction of stocks
 - production
 - use
- (b) Regional arms control - Europe

2. Verification Type:

- (a) On-site inspection - selective
 - challenge
- (b) Remote sensors

3. Source:

Westing, Arthur H. "Ban Chemical Weapons in Europe". Bulletin of the Atomic Scientists 41, no. 5 (May 1985): 17-19.

See also: - Warsaw Treaty States. "The question of freeing Europe from chemical weapons". CD/437, 23 February 1984.

4. Summary:

Noting the calls made by the Independent Commission on Disarmament and Security Issues (the Palme Commission, 1982 see abstract A3(A82)) and the Warsaw Pact states (see CD/437) for a chemical weapons-free-zone in Europe, the author specifies three criteria which must be satisfied by a treaty establishing a chemical weapons-free zone:

- (1) The treaty must encompass all of Europe.
- (2) Verification should consist of on-site inspection on a challenge basis of destruction of stocks of chemical weapons and of non-production. The level of potential intrusiveness would fall in between the proposals made by the Soviet Union ("Basic provisions of a convention on the prohibition of the development, production and stockpiling of chemical weapons and their destruction", CD/294, 21 July 1982 (abstract N15(G82)) and the United States ("Draft convention on the prohibition of chemical weapons", CD/500, 18 April 1984 (abstract C79(G84))). Remote sensing devices are inadequate to remove doubts and suspicions about convention violations, therefore they must be supplemented by arrangements which grant prompt access to inspectors.
- (3) Armed forces within Europe should not be equipped with any chemical weapons or related equipment and should not be allowed to carry out training programs involving offensive use of chemical weapons.

Chemical products which can be used both for military and civilian purposes are not deemed to be chemical warfare agents if the quantities produced do not exceed peaceful civilian requirements. The Agency is notified by the Federal Republic of Germany of the peaceful civilian requirement of such products and

verifies that the quantities produced do not exceed peaceful civilian requirements. Hence this control is by its very nature a quantitative control.

The initiative for field inspections lies with the Agency. After the competent national authority of the Federal Republic of Germany and the management of the factory concerned have agreed to the Agency's request to be allowed to carry out controls, the Director of the Agency appoints two to four officials of different nationality, one of them a national of the country in which the controls are to be carried out. A representative of the competent national authority assists the Agency in the execution of its controls in conformity with the treaty.

During such controls the representatives of the Agency enquire about the organization, operation and production programme. Their questions are answered in so far as no business or production secrets are involved.

The subsequent visit to the production plant covers only those departments where the decisive phase of reaction occurs. The inspectors ask to be shown built-in measuring sensors so that they can verify the quantities of the product or pre-products employed in the production of a substance and the final output. If further clarification is required, the findings are compared with the factory's records or books.

Special attention is paid by the inspectors to the factory's safety regulations. They are visible, cannot be concealed, and, together with the lack of special equipment and installations indicate in the clearest possible way that no production of chemical warfare agents takes place

The taking of samples as a means of control is considered by all experts to be useful and effective in special cases for identifying specific substances and determining whether they are prohibited agents of warfare. The high degree of toxicity of most of these substances poses the problem of liability in case of accidents or damages caused or suffered by inspectors.

The inspection is carried out in stages in order to avoid, as far as possible, any interference with the civilian sector ... The Control Agency reports to the Council of the Western European Union annually. This report states the number of controls that have been carried out, the names of the firms concerned, and the outcome of the controls, indicating - but not specifying - any difficulties or problems that may have occurred.

C83(G70)

C83(G70)

Proposal Abstract C83(G70)

1. **Arms Control Problem:**

Chemical weapons - production

2. **Verification Type:**

- (a) On-site inspection - selective
- (b) Short-range sensors - sampling

3. **Source:**

Japan. "Working Paper on the Question of the Prohibition of Chemical Weapons". CCD/301, 6 August 1970.

See also: CCD/344, 24 August 1971.

4. **Summary:**

Japan claims that verification of a ban on CW production will have to rely on recourse to ad hoc inspections based on a complaints procedure. In this regard reporting of production figures of certain chemical substances will be important for providing evidence to support any complaint.

The method of on-site inspection would use techniques similar to those developed to check the contamination of rivers or living things by agricultural chemicals. These include gas chromatography and coulometry detectors. Checks would be made for the prohibited agent itself, production precursors and waste products.

CCD/344 further elaborates on this method. What is needed is a highly sensitive means of micro-analyzing a methylphosphorus bond (unique to nerve agents as opposed to other organophosphorous compounds). This might be done through gas chromatography. Using this method one could test for very small quantities of a substance in the liquid wastes from the plant, in the soil and dust around plant, in the production equipment, or in the worker's clothing.

If such a method of detecting methylphosphorus compounds were developed it might be possible to detect nerve agent production by checking the atmosphere or river water at a considerable distance from the plant. At present the method needs further testing.

C84(A74)

C84(A74)

Proposal Abstract C84(A74)

1. Arms Control Problem:

Chemical weapons - production

2. Verification Type:

(a) On-site inspection - selective

(b) International exchange of information - declarations

3. Source:

Scoville, H. "A Leap Forward in Verification". In SALT: The Moscow Agreements and Beyond, pp.160-182. Edited by M. Willrich and J.B. Rhinelander. New York: The Free Press, 1974.

4. Summary:

Recognizing that economically sound procedures for producing organophosphorous compounds, for insecticides for example, are somewhat different than those required for producing organophosphorous CW agents, and that safety measures required for CW agent production are greater than those for insecticides, the author proposes measures that would simplify differentiation between the two. It might be agreed that the unusual procedures for CW will not be undertaken for the insecticide industry without explaining such action to the parties to the agreement, and allowing on-site inspection of the specific plant to provide assurance that a chemical agent was not being produced. Further, countries could declare the extent of their production of industrial toxic chemicals and account for their use in order to provide assurance that significant diversion to military uses was not taking place.

C85(G79)

C85(G79)

Proposal Abstract C85(G79)

1. Arms Control Problem:

Chemical weapons - production
 - stockpiling

2. Verification Type:

(a) On-site inspection - selective
 - obligatory
(b) Remote sensors - sampling
 - satellites

3. Source:

Denmark. CD/PV.44, 24 July 1979.

4. Summary:

Verification procedures should be as little intrusive as possible. This could include monitoring of air and waste water samples collected even at a great distance from manufacturing sites. In addition, the possibility of making use of modern technology including observation satellites, should be explored. However, until non-intrusive methods have been sufficiently developed and an international consensus is subsequently achieved on their application, visits by a highly qualified international agency seem to be indispensable. Such visits, properly arranged, could be carried out without unjustifiable intrusion and without the disclosure of state or commercial secrets. An adequately controlled CW ban need not, therefore, await development of more sophisticated extraterritorial verification procedures.

1. Arms Control Problem:

Chemical weapons - production

2. Verification Type:

- (a) On-site inspection - selective
- (b) Records monitoring - plant
- (c) Short-range sensors - monitoring devices
 - sampling
- (d) International control organization

3. Source:

Federal Republic of Germany. "Working Paper on Some Aspects of International Verification of Non-production of Chemical Weapons: Experience Gained in the Federal Republic of Germany".
CD/37, 12 July 1979.

See also: - CD/PV.42, 17 July 1979.
- CD/PV.29, 24 April 1979.
- Abstract C82(A70)

4. Summary:

Part I of the West German paper describes the practices and principles for the verification activities conducted by the Armaments Control Agency (ACA) of the Western European Union. Under the revised Brussels Treaty of 23 October 1954 the FRG agreed not to produce chemical weapons and the ACA was set up to verify this undertaking. ACA controls consist, first, of evaluating written information, supplied upon request and, second, of on-site inspections. These control extend to substances which are specified on a list established and continuously reviewed by experts. Excluded from controls are equipment, installations and substances used for civilian and scientific research. This exclusion encompasses small, militarily irrelevant quantities of recognized CW substances used for medical purposes. Dual-purpose substance are not deemed to be CWs if the quantities produced do not exceed peaceful civilian requirements. The controls determine whether the quantities produced exceed those requirements.

Production controls are applied to end-items, not to manufacturing processes or chemical factories. Non-production controls apply to substances with characteristics which have been defined as necessary for the production of CWs though they are not CWs themselves. Controls start with the phase of production immediately preceding the completion of the end-item.

The initiative for on-site inspections lies with the ACA. Its director appoints from two to four inspectors of different nationalities including one from the country where the inspection is to occur. A representative from that country also assists in the execution of the inspection.

The inspection is carried out in stages so as to minimize interference. As soon as the inspectors are satisfied that the non-production commitment is being met, the control must cease. The first stage is the visit to the production plant which includes searching for special safety precautions. These precautions are highly visible and their absence together with the absence of special equipment and installations provide the clearest possible indication that no CWs are being produced. This inspection covers only those departments dealing with the decisive phase of reaction.

The second stages extends control to the employment of initial and intermediate products in the controllable stage. If there is still uncertainty whether CWs are being produced, the factory's records may be checked against instrument readings. The fourth and final stage involves taking samples to identify specific substances.

After the inspection, the inspectors make an oral report to the ACA's director and a written, classified report exclusively for the agency's file. Neither the factory concerned nor the competent national authority is consulted in the preparation of these reports. The representative of the country who has taken part in the inspection reports to the national authority concerned and this report is transmitted to the management of the factory.

The staff of the ACA are forbidden to reveal information obtained as a result of their duties. the annual reports of the ACA indicate the number of controls, the companies involved and the the results but do not go into details. Special protection is also accorded to industrial, economic, commercial and scientific information.

Part II of the FRG paper discusses the results of a workshop held in the country from 12 to 14 March 1979 which was attended by experts from several countries. This workshop included visits to chemical plants. It demonstrated that:

- in the absence of safety precautions no super-toxic compounds can be manufactured in chemical industry plants,
- the absence of such safety precautions is perceivable in the course of a plant inspection and indicates the non-production of CWs,
- a rapid conversion of available production plants into CW producing plants is technically not feasible, and
- the chemical industry in the FRG does not object to the controls.

The workshop visits also indicated that any effective verification of a CW ban must include international control measures and that regular on-site inspection by an international control authority should be an indispensable component. Other international control measures such as near-site inspections (emission analyses), satellite monitoring, statistical control of the production figures, and the consumption of raw materials and basic chemicals do not suffice to replace on-site inspection, nor can off-site inspections and the opto-electronic sealing of shut-down factories be a satisfactory substitute.

In Part III of its paper West Germany states two principles for practical verification of a world-wide CW production ban, based on its experience:

- (1) effective verification requires adequate on-site inspection of current production, and
- (2) such inspection can be conducted without impairing industrial process and legitimate commercial interests of the plant concerned.

The necessary prerequisites of such verification are:

- (1) precise definition of CWs,
- (2) pure and applied research and civilian use should be excluded from controls,
- (3) information should be given to the control authority annually to ease the task of selecting factories eligible for non-production controls,
- (4) The controllable stages must be defined; specific substances must be defined as initial products,
- (5) non-production controls should be implemented gradually, and
- (6) the civil peaceful requirements of specific (ambivalent) chemical substances on the prohibited list should be roughly estimated and reported each year.

In PV.29, the FRG representative added that the character and scope of suitable verification measures depends upon the nature and number of the prohibited agents. An objective definition of these agents such as that presented in the FRG working paper of 22 July 1975 (CCD/458) would greatly facilitate on-site inspections.

C87(A80)

C87(A80)

Proposal Abstract C87(A80)

1. Arms Control Problem:

- Chemical weapons - production
- destruction of stocks
- destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors - satellite

3. Source:

Meselson, Matthew and Julian Perry Robinson. "Chemical Warfare and Chemical Disarmament." Scientific American 242, no. 4 (April 1980): 38-47.

4. Summary:

The authors contend that maintaining a chemical retaliatory capability or entering into an agreement to limit chemical weapons are alternative approaches to minimizing the threat presented by the chemical weapons of an adversary. While both approaches have their risks, the present situation for NATO reduces the attraction of the former and increases that of the latter. Specifically, NATO's greatly improved protective capability against chemical weapons, the availability of a wide range of conventional and nuclear weapons which overlap and overshadow the capabilities of chemical weapons, and, finally, political constraints on the development and deployment of a more effective chemical retaliatory force, all argue in favour of an arms control approach.

Existing intelligence gathering methods are insufficient for monitoring a CW agreement according to the US and other NATO countries. However, the authors contend, a verification system need not be able to detect all activities and facilities that would constitute a technical violation of the treaty. "What is required is a high likelihood of detecting chemical-warfare preparations on a scale large enough to constitute a major military threat" (p.47). In this context, the present high level of NATO's chemical defence capability raises the scale of chemical-warfare preparation which would be required in order to constitute a serious military threat which, in turn, makes concealment more difficult and intrusive inspection less necessary.

One approach for reliable verification of destruction of declared stocks would be to transport them to one or more sites where their destruction would be observed by international inspectors. This process would require several years during which the participating countries could take other measures to assure themselves that the treaty was being implemented.

The elimination of declared production facilities could be monitored by satellite following restricted on-site inspections to ensure that the facilities were of the types declared.

The verification of the absence of undeclared stocks or facilities could be addressed by carefully designed measures based on the right to request on-site inspection where other methods had raised questions.

C88(A80)

C88(A80)

Proposal Abstract C88(A80)

1. Arms Control Problem:

- Chemical weapons - production
 - stockpiling
 - destruction of stocks
 - destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
 - challenge
- (b) National self-supervision
- (c) International exchange of information - declarations
 - reports to international body
- (d) International control organization
- (e) Records monitoring - economic

3. Source:

Robinson, J.P. Perry. "The Negotiations on Chemical Warfare Arms Control". Arms Control 1, no.1 (May 1980): 30-52.

4. Summary:

Robinson discusses attempts to negotiate a treaty on chemical warfare arms control in the Conference of the Committee on Disarmament (CCD) and its successor the Committee on Disarmament (CD). He concludes, pessimistically, that the prospects for negotiating a treaty are slim because chemical weapons have been assimilated into military forces and doctrine. With regard to verification, Robinson asserts that it is practicable if parties are willing to accept some uncertainties. Furthermore, the gap between the American and Soviet positions on verification is not unbridgeable nor is it as wide as most people maintain.

A minimum requirement for verification is that it should reduce the likelihood of mistaken allegations of treaty violations. Another requirement is that verification should not detract from legitimate military or industrial secrecy. The task therefore is to provide for measures which create sufficient transparency to build confidence, but which do not compromise security and secrecy. Verification has assumed particular importance because "success in the negotiations now appears contingent upon general agreement to accept on-site inspection as a verification technique" (p.30). Robinson claims that the USSR and US are not far apart on this issue for the following reasons. Soviet opposition to mandatory international on-site inspection is based on fears of loss of industrial and military secrecy, but the fact that all chemical weapon agents possessed by the USSR have been

described in the open literature means that "the basic untenability of this argument may be expected to lead, sooner or later, to its abandonment" (p.42). In fact, in the seventh round of negotiations the Soviet Union accepted in principle the idea of 'challenge' on-site inspections. On the American side, there has been a concession that routine inspection of civilian chemical production plants, with the exception of facilities handling certain dual purpose chemicals, would not be necessary for verification purposes.

National means of verification would probably have to be supplemented by international machinery. Attempts to minimize the intrusiveness of international on-site inspections have involved the concept of "focussed" systems of verification. The focussing method consists of states declaring stocks of chemical weapons and production facilities and then accepting intrusive techniques for monitoring their destruction.

One drawback of the focussed system of verification is that it can assist verification of destruction but not non-production. This problem may be of significance for states which do not possess stocks of chemical weapons. Therefore, although the idea of national systems of control has received little attention since the socialist countries have been willing to discuss international control measures, the usefulness of national control organs should be reconsidered. Obligatory exchanges of information between states could enhance confidence in compliance. Phosphorus accountancy and information exchange on research and development in anti-chemical protection could prove useful. Robinson suggests that "it may well be, in fact, that the only feasible way of achieving adequate verification of chemical non-armament lies in such a linking of national control organs by means of information exchange systems" (p.44). The linkages could be overseen by a subsidiary body of the United Nations or a consultative committee of parties to the treaty with a secretariat and technical facilities of its own.

C89(A80)

C89(A80)

Proposal Abstract C89(A80)

1. Arms Control Problem:

- Chemical weapons - production
- stockpiling
- destruction of stocks
- use

2. Verification Type:

- (a) On-site inspection - selective
- (b) International exchanges of information

3. Source:

Stockholm International Peace Research Institute. Yearbook of Armaments and Disarmament: 1980. London: Taylor and Francis, 1980, pp. 370-71.

4. Summary:

Abolishing a category of weapons which have already been used on a large scale in combat and have comparable mass destruction effects to that of nuclear weapons would involve important security aspects for the parties who would need to assure themselves that the proscribed items had actually been destroyed and were not being manufactured. Unilateral, unchecked declarations by governments would provide inadequate assurance. Self-verification exclusively by nationally constituted bodies would not be sufficiently important. Extra-territorial verification by national technical means is open to only a few states and is of limited use anyway. International control is therefore essential, including both sporadic and systematic on-site inspection. Sporadic inspection may be used to investigate allegations or clandestine production illicit use. In the case of stockpiles of CWs there is no reliable substitute for systematic on-site monitoring of their destruction. There is evidence that such on-site inspection (sporadic or systematic) can be devised so as to rule out disclosures of legitimate commercial or military secrets.

To fill some inevitable gaps in the verification procedures adopted, several voluntarily undertaken confidence-building measures might be used including:

- (1) official statements of national policies concerning CWs;
- (2) gradual removal of secrecy surrounding CWs through exchanges of information;
- (3) visits of foreign technical experts to relevant chemical facilities; and
- (4) attendance at military exercises by foreign observers.

C90(G80)

C90(G80)

Proposal Abstract C90(G80)

1. Arms Control Problem:

Chemical weapons - production
- stockpiling

2. Verification Type:

- (a) On-site inspection - selective
- challenge
- (b) Complaints procedure - consultative commission
- referral to General Assembly
- referral to Security Council
- (c) International control organization
- (d) International exchange of information - declarations
- (e) Short-range sensors - sampling
- (f) Review conference

3. Source:

Canada. "Organization and control of verification within a chemical weapons convention". CD/113, 8 July 1980.
See also: - CD/PV.45, 26 July 1979.

4. Summary:

Canada (CD/113) states that it is necessary that adequate verification measures be available in any CW convention. A Consultative Commission could meet regularly to review events and also at the request of parties. It alone, however, is unlikely to be able to adequately monitor verification and compliance.

An international verification control agency might be contemplated. It would be directed by an executive officer and would contain a secretariat to provide for co-ordination of necessary services and dissemination of information. It could also include inspection teams and other technical personnel for processing of economic information and scientific data including the testing of samples. The agency might report to the Consultative Committee as well as the UN. As a model for this international control organization, Canada, in PV.45, suggests the IAEA.

Each party would be required to establish a national verification agency to review national activities under the treaty as well as to report results and provide other information to the international agency. These national agencies would host international inspection teams and provide candidates for the international agency's staff.

Some on-site inspection will be required to monitor national activities. National agencies would act in this role in conjunction with international arrangements particularly at critical phases of some activities and in challenge situations. On-site sampling will be

necessary for some activities and this must involve standardized techniques. When international inspectors are involved duplicate samples should be taken for analysis in national and international laboratories.

Other verification methods include; initial declarations, periodic exchanges of statements and review conferences. In addition, bilateral discussions, appeals to the Consultative Commission and appeals to the UN Security Council or General Assembly might be included.

In PV.45, Canada supports the notion of implementing systems of verification in stages, with different approaches for the monitoring of different activities. Verification by challenge may be useful particularly in monitoring initial statements but it will have to be backed up by other system such as national technical means and on-site inspections.

5. **Selected Comments of States:**

Belgium (CD/PV.98, 7 August 1980) supported the Canadian proposal.

C91(G80)

C91(G80)

Proposal Abstract C91(G80)

1. Arms Control Problem:

- Chemical weapons - production
- destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
- (b) Records monitoring - economic
- (c) Remote sensors - sampling
 - satellites
- (d) Short-range sensors - monitoring devices
 - sampling
 - seals
- (e) International exchange of information
- (f) International control organization

3. Source:

France. "Control of the Non-manufacture and Non-possession of Agents and Weapons of Chemical Warfare". CD/106, 27 June 1980.

See also: "Elements of a reply by the French delegation to the questionnaire relating to chemical weapons submitted by the Netherlands to the Committee on Disarmament (CD/41)". CD/104, 26 June 1980.

4. Summary:

The prohibition on manufacture will be total regarding single purpose agents while production of dual purpose chemicals will be permitted for civilian needs. Control of non-manufacture would therefore cover exclusively the first category. In the case of dual purpose chemicals, control would ensure that amounts produced do not exceed levels needed for civilian needs and that any surpluses are not used in chemical munitions.

Single-Purpose Agents:

Non-manufacture should be monitored at two levels:

- (1) ensuring CW plant shut down or conversion to civilian use; and
- (2) ensuring plants producing related chemicals (eg. pesticides) are not converted to produce CWs (such conversion would be possible in a few months).

The first, essential step is registration by countries of all CW production facilities. However, only thorough on-site inspection can provide effective control. Fear of disclosure of military or industrial secrets in the case of super-toxic substances is not justified because, by definition, they are intended only for military use and, in the spirit of the agreement itself, there can be no military or industrial secrets in this area.

Other monitoring methods such as processing of statistical data provided by member countries and remote detection either by sensors based on satellites or on land outside the country being monitored, are unreliable. Even if this lack of reliability could be offset by using several of these methods in combination, such a system would be too cumbersome and would not yield results that were certain.

Concerning processing of statistical data, the data is usually very incomplete and the content and presentation vary in different countries. In addition, there are considerable annual fluctuations in the data for reasons that have nothing to do with production of CWs and which may lead to unjustified suspicion. Furthermore, in a country producing large amounts of pesticides and consuming large amounts of raw materials, slight diversions which would be initially imperceptible could be used to manufacture large quantities of CWs. A great deal of technical work will have to be done before this technique can be used with any chance of success, especially regarding harmonization of data collection in member countries.

Although remote detection of CWs in gaseous effluents is theoretically possible, no experimental tests of these methods have yet been attempted and it is doubtful whether they are applicable in the near future.

The CW agreement should lay down procedures for ensuring that shut-down plants are not restarted. In order to avoid permanent and burdensome on-site inspection, unbreakable sealing devices could be used. Other surveillance methods - seismic detectors, and closed-circuit television - have not been tested. All these measures require at least periodic presence by inspectors.

In the case of monitoring pesticide plants, thorough on-site inspection could involve disclosure of industrial secrets. To avoid this, two alternatives have been suggested: brief inspections and effluent analysis. The purpose of brief inspections would be to detect signs of unauthorized production of CWs. Particular attention would be paid to safety measures at the plant including:

- airtight processing units kept at less than atmospheric pressure to prevent leaks,
- presence of inert gas in vessels and an inert-gas rapid-purge system,
- gravity-flow movement of liquids,
- remote controls and alarm devices,
- masks and special impermeable clothing,
- 'hot' spaces entered by locks fitted with sprinklers,
- automatic sampling devices,
- emergency air and power supply, and
- special medical supervision.

Brief inspections, however, can only serve as a complement, enabling other indicators collected elsewhere to be confirmed.

Effluent analysis involves sampling liquid effluent and the air in the immediate vicinity of the factory. Concentrations of these samples permit analysis for presence of CWs or their degradation

products. While these methods have proved themselves in the laboratory, they have not been tried under practical conditions. Further refinement of the method is needed.

Dual-Purpose Chemicals:

The only available monitoring method here is statistical data analysis aimed at identifying production surplus to civilian needs. Efforts should be concentrated on detection of munitions filling facilities once a surplus has been identified.

In the view of France, the first monitoring procedure to be developed should be statistical data analysis which applies to verification of both single and dual-purpose chemicals. This will required each signatory to provide the following information:

- the nature, quantity and utilization of organophosphorous compounds, raw materials, intermediates and precursors;
- the nature, quantity and utilization of dual-purpose substances produced; and
- the proposed activities of newly constructed chemical factories.

Parties should also submit periodic reports on their compliance with the convention.

Only on-site inspection of an international character perhaps accompanied by the collection of samples can give adequate guarantees. Such inspection is essential both for systematic verification and for a check resulting from a challenge procedure. National verification should at least be accompanied by international procedures for monitoring declared production sites. Such procedures should include verification of non-reactivation of "mothballed" factories and monitoring of the environment of operating factories. Satellites might be suitable for the former purpose and periodically read "black boxes" for the latter. In all cases of a breach or a request for inquiry, on-site inspection by an international body should be accepted by the suspected state. It is therefore essential to establish an international body such as a Consultative Committee. In CD/105, France suggests that the committee include a permanent secretariat and a corps of inspectors as well as a specialized laboratory.

C92(A81)

C92(A81)

Proposal Abstract C92(A81)

1. Arms Control Problem:

- Chemical weapons - production
- stockpiling
- destruction of stocks

2. Verification Type:

- On-site inspection - selective
- obligatory
- challenge

3. Source:

Lundin, S.J. "Possible Use of the Concept of Verification by Challenge for a Chemical Weapons Convention". In Proceedings of the Thirty-First Pugwash Conference on Science and World Affairs, pp. 225-230. London: Taylor and Francis, 1981.

4. Summary:

International verification through on-site inspection is necessary for a chemical weapons convention. Continuous inspection would be unacceptable except during the destruction of chemical weapons stocks. Verification by challenge would be more appropriate. On-site inspection may be requested "if sufficiently substantiated and performed as an international undertaking, and if accepted by the challenged party" (p.226). The challenged party may refuse the request "if it can present acceptable reasons that such verification would jeopardize its supreme national interest" (p.226).

If continuous inspection of the destruction of stockpiles of chemical weapons cannot be permitted, then on-site inspections on an ad hoc basis or under an imposed quota should be allowed. Requests may be refused if the destruction takes place next to military stocks or other munition or equipment. Refusal should not be allowed in the case of on-site verification of the non-production of chemical agents if the grounds for refusal is the risk of disclosing technical or commercial secrets. However, restrictions on sampling the production and taking photographs would be permissible. Refusal would also be forbidden in the case of a request to visit a "mothballed" chemical agent production plant if the reason given is that such a visit would threaten national security. An agreement to forego a chemical weapons capability would render such concerns illogical. In order to avoid stalling negotiations over the number of obligatory on-site inspections (as occurred during CTBT negotiations in the 1960s), the parties should first agree in principle to allow a limited number of obligatory on-site inspections and then proceed to negotiate the specific details of such an arrangement.

C93(G81)

C93(G81)

Proposal Abstract C93(G81)

1. Arms Control Problem:

- Chemical weapons - production
- research and development
- stockpiling
- use

2. Verification Type:

- (a) On-site inspection - selective
- (b) International exchange of information

3. Source:

Sweden. "Prohibition of retention or acquisition of a chemical warfare capability enabling use of chemical weapons (4 annexes)". CD/142, 10 February 1981.

4. Summary:

The paper outlines several considerations relevant to the prohibition of a chemical warfare capability. One of the advantages of such a prohibition is that it may increase the effectiveness of verifying compliance with a CW convention since the number of activities proscribed is increased. The paper lists activities which might be included in the ban. Among the "undertakings" which would be spelled out in annexes to a convention banning a capability to use CWs are:

- (1) regular visits by observers to military units, military stockpiles and air fields,
- (2) on-site inspection when complaints about violations are made, and
- (3) provision of information to other parties either directly or through a consultative committee, regarding several activities such as:
 - (a) military CW protective posture,
 - (b) general military education,
 - (c) equipment for use of CWs, and
 - (d) civil defence activities.

C94(A82)

C94(A82)

Proposal Abstract C94(A82)

1. Arms Control Problem:

- Chemical weapons - production
- binary agents

2. Verification Type:

- (a) On-site inspection - selective
- (b) Remote sensors

3. Source:

Levinson, Charles. "The Chemical Workers' Report on Chemical Warfare" Geneva: International Federation of Chemical, Energy and General Workers' Union, 1982.

4. Summary:

This paper provides some detailed proposals for the verification of a chemical weapons agreement, based on a sound knowledge of the chemicals industry. Some difficulties in verifying an agreement are noted. Since chemical agents are not readily visible, they are not easily detected using national technical means. Further, the restriction of weapons according to their purpose is not an air-tight criterion, so that some chemicals with military uses might continue to be produced for peaceful purposes. The alleged recurrence of breaches and the threat that they pose in a comprehensive ban have also significantly reduced confidence in any treaty which lacks adequate verification provisions. Finally, the whole verification process is complicated by the sheer magnitude of the task, given the size, diversity and scope of the chemicals industry.

It is stated that more stringent verification is necessary in view of these factors. A number of possible means of verification are suggested which might overcome such obstacles. Various forms of on-site inspection which will detect key technical processes or chemical agents are explained in detail. By looking for certain central components, it is possible to ensure industry-wide compliance, as only a limited number of plants in a few countries will produce these chemicals. Periodic spot-checks for the presence of certain tell-tale chemicals will also ensure that some chemical weapons are not being produced. In some instances, it may also be possible to ensure compliance simply by taking samples of plant wastes as a less intrusive means of verification.

In conclusion, verification of chemical weapons may be effectively monitored on a world-wide basis by identifying and isolating the critical stages of weapons production. This means that the magnitude of the verification task is not so daunting as it might at first appear. The task may be broken down according to country, segment of industry, the level of the production process, or those chemicals which are used only in weapons production. A selection of

key indicators may be made by chemical workers who are familiar with the production process and the structure of the industry. This method of verification would require that countries 'accept their responsibility' in permitting on-site inspection; these countries in turn should not be concerned about industrial secrets, given the high level of economic integration which already exists.

A final note on the so-called "Vodka-Cola" commercial projects provides a good example of a joint Soviet/US undertaking wherein economic cooperation allows "the continuous presence of Western capital equipment and managers in Soviet enterprises" (p.43). In this instance, the need for technology and expertise has outweighed the Soviet Union's "historic phobia about secrecy". Thus, economic self-interest will permit the Soviet Union to overlook security interests, and "if the Soviet Union sincerely wants a chemical weapons ban, it should be able to accept the presence of inspectors as it does the presence of Western supervisors in co-production projects" (p.44).

C95(G82)

C95(G82)

Proposal Abstract C95(G82)

1. Arms Control Problem:

- Chemical weapons - production
 - stockpiling
 - destruction of stocks
 - destruction of facilities
 - binary agents

2. Verification Type:

- (a) On-site inspection
 - selective
 - challenge
 - sampling
- (b) Short-range sensors
 - sampling
 - monitoring devices
- (c) Records monitoring - plant
- (d) Remote sensors
- (e) International control organization
- (f) International exchange of information - declarations
- (g) Complaints procedure - consultative committee
 - referral to United Nations

3. Source:

Federal Republic of Germany. "Working paper on principles and rules for verifying compliance with a chemical weapons convention". CD/265, 24 March 1982.

See also: - "Working paper on some aspects of international verification of non-production of chemical weapons: experience gained in the Federal Republic of Germany". CD/37, 12 July 1979 (see abstract C86(G79)).

- "Chemical weapons convention. Working paper: proposals on 'declaration' 'verification' and the 'Consultative Committee'". CD/326, 6 September 1982.
- CD/PV.166, 25 March 1982
- CD/PV.171, 15 April 1982

4. Summary:

The Federal Republic of Germany outlines what it considers to be the essential verification principles which a convention must contain. The paper (CD/265) advocates regular on-site inspections of declared chemical warfare agent plants using a procedure by which the international Consultative Committee selects, by drawing lots, a specific number of plants each year for monitoring. Inspection on challenge would be necessary to investigate particular incidents. The

intention is to minimize the number of inspections required. Challenge inspections would cover all areas included in the ban and regular inspections would be aimed at particularly sensitive areas covered by the ban. Regular inspections would cover:

- (1) The destruction of stocks of supertoxic chemical weapons,
- (2) The destruction of facilities for manufacturing chemical warfare agents,
- (3) Checks of current industrial production of organophosphorous substances to ensure that chemical warfare agents are not being produced for hostile purposes, and
- (4) Checks to ensure that the permitted quantity of chemical warfare agents allowed by the convention is not exceeded.

On-site inspections would take place periodically at declared storage facilities where monitoring is continuous and annually at facilities producing super-toxic chemical substances for protective purposes and facilities producing organophosphorous substances.

The method of verification would be established through collaboration between the Consultative Committee and the appropriate national authorities. Verification would be conducted nationally by "national technical means" and internationally by the consultative committee which would be empowered to conduct on-site inspections. Parties to the convention would be obliged to permit the following inspection procedures:

- (1) On-site inspections involving sampling and toxicological or chemico-physical determination of samples,
- (2) Near-site inspections involving analyses of effluent air and water from the production plant,
- (3) Off-site inspections involving centralized monitoring with the aid of sensor-transmitted data, and
- (4) Statistical evaluation of production, supply and reprocessing sheets.

The proposal requires the parties to make a declaration of existing stocks of chemical weapons by type and quantity as well as of manufacturing and munitions-producing facilities within 30 days after the convention has entered into force. The parties would also make an annual declaration of progress in the destruction or diversion of stocks of chemical weapons and their production facilities.

Verification by the Committee of the destruction of munitions and non-munitions stocks would be restricted to super-toxic chemical agents and their binary components. The paper claims that the military significance of other agents and the size of the effort required to verify their destruction mean that it is not necessary to verify the destruction of all chemical warfare agents prohibited by the convention. Chemical plants producing organophosphorous compounds on an industrial basis would be included in the convention. Binary chemical warfare agents would be grouped together with super-toxic chemical warfare agents because they are of equal military significance. Binary agents would therefore be included in the convention and would be subject to verification. In CD/PV.166, the

FRG states that binary production techniques can be subject to reasonable and effective verification. The non-production of binary weapons can be verified by taking samples which are analyzed at the inspection site itself. Analysis would prove the non-production of key precursors of binary weapons, but would not reveal the actual composition of the sample.

Parties to the convention suspecting a violation would be able to request a special check by the Consultative Committee. A special check would seek to establish the facts and could entail an on-site inspection. A party would be able to reject a request for a special check only if "the overwhelming majority of the members of the Consultative Committee consider the request in question to be totally unfounded". If a special check does not resolve the matter, then each party may appeal to the United Nations. A more detailed explanation of the appeal process is not provided.

The FRG suggests that the proposed arrangement is both acceptable and effective. It is acceptable because it is non-discriminatory, it includes only the most significant and hazardous chemical weapons, it requires only limited manpower and expenditure and it does not allow production secrets to be revealed. It is effective because it creates a high risk for any party which intends to violate the convention and because it includes binary chemical weapons.

C96(G82)

C96(G82)

Proposal Abstract C96(G82)

1. Arms Control Problem:

Chemical weapons - production
- binary

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

The Netherlands. "Working paper concerning the verification of the presence of nerve agents, their decomposition products or starting materials downstream of chemical production plants". CD/307, 10 August 1982.

See also: - "Working paper concerning the verification of the presence of nerve agents, their decomposition products or starting materials downstream of chemical production plants". CCD/533, 22 April 1977 (reissued as CD/306, 10 August 1982). (See abstract I17(G77)).

4. Summary:

Working paper CCD/533 identified a relatively non-intrusive method to determine the presence of nerve agents, their decomposition products or starting materials downstream of chemical production plants. This method is based on identification of a phosphoromethyl (P-Me) bond which is present in most of the super-toxic nerve agents. The new working paper (CD/307) addresses two subjects of further investigation mentioned in CCD/533: the applicability of the method with regard to precursors for binary nerve agents and a study of the background levels of P-Me compounds present in several types of water. The new working paper also slightly revises the original proposed verification procedure of chemical testing.

This technical paper outlines the chemical process for detecting binary precursors of nerve agents and supplies references to scholarly articles which discuss the process. The paper concludes that background levels of P-Me compounds in industrially polluted water would not affect the detection and verification procedure. The paper proposes further work to isolate chemical warfare agents by concentrating trace amounts from water samples. It is hoped that this will give the verification procedure greater specificity.

C97(G82)

C97(G82)

Proposal Abstract C97(G82)

1. Arms Control Problem:

Chemical weapons - production
- binary agents

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

United Kingdom. CD/PV.165, 23 March 1982.

4. Summary:

The United Kingdom suggests that the production of binary chemical weapons will not make problems of verification more difficult. The precursors of binary weapons must be chemically highly reactive, therefore storage requirements for at least one of the precursors would be similar to those for other chemical warfare agents. A system of on-site inspections of a random sample of major chemical production facilities such as that proposed by the United Kingdom in working paper CD/244 (see abstract P27(G82)) could cope with this problem. Verification of key precursors would thus be similar to that required for other lethal chemicals and less difficult than verification of dual-purpose chemicals.

5. Selected Comments of States:

The United States (CD/PV.166, 25 March 1982) presents an argument similar to that of the United Kingdom when discussing binary chemical weapons production. A binary production plant would have to utilize special devices for handling toxic chemicals so problems of verification are not increased. National technical means are not adequate for monitoring conventional chemical warfare plants or binary facilities so on-site inspections would be both necessary and adequate for verification.

Bulgaria (CD/PV.166, 25 March 1982), however, disagrees with the evaluations of the United Kingdom and the United States. Bulgaria believes that binary weapons will further complicate the distinction between commercial chemicals and those which can be used for chemical weapons. Binary weapons will make verification and control of non-production of chemical weapons more difficult. Storage problems for precursors of binary weapons can be overcome and this will increase problems of verification.

The USSR (CD/PV.166, 25 March 1982) states that even if international inspectors are allowed to enter plants producing the separate components of binary systems as well as cases for binary

munitions, they will not be likely to detect binary weapons because of problems in identifying the purpose of binary agents. It would, therefore, be possible to stockpile chemicals for production of binary weapons. In this way, the production of binary weapons poses great difficulties for verification.

Czechoslovakia (CD/PV.178, 12 August 1982) also believes that it is not feasible to apply the same verification methods to binary weapons as are used to verify traditional types of chemical weapons. Development of binary weapons will facilitate the production of chemical weapons under the guise of commercial production.

C98(A83)

C98(A83)

Proposal Abstract C98(A83)

1. Arms Control Problem:

- Chemical weapons - production
 - stockpiling
 - destruction of stocks
 - destruction of facilities
 - binary agents

2. Verification Type:

- (a) On-site inspection - selective
 - challenge
- (b) Short-range sensors - monitoring devices
- (c) Complaints procedure - consultative commission

3. Source:

Feigl, H.M. "On Countering the Dangers of Chemical Warfare: Some German Points of View". In Chemical Weapons and Arms Control: Views from Europe, pp. 16-21. Rome: Centre di Studi Strategic, June 1983.

4. Summary:

The author presents the position of the Federal Republic of Germany on the military and arms control implications of chemical weapons. A chemical weapon deterrent appears necessary to prevent a chemical attack, but development of a chemical weapons arsenal "would not indicate an irreversible trend of arms race" (p.18). Despite its own vulnerability to a chemical attack, the FRG has, since 1954, foregone the production of biological and chemical weapons. This has involved an acceptance of international verification of non-production. The experience of the FRG has shown that "national technical control" is inadequate to monitor a chemical weapons convention, therefore on-site inspections by international teams of experts are a necessary part of an agreement. The Soviet reluctance to accept intrusive measures of control has created a major obstacle to progress towards a convention.

'Adequate' verification would involve regular on-site inspections and inspections on special request supplemented by monitoring equipment such as 'black boxes'. Challenge inspections would cover all areas of the ban whereas regular inspections would apply to particularly sensitive areas covered by the ban. Regular checks would be conducted to monitor the destruction of stocks of chemical weapons including precursors, the destruction or dismantling of production and filling facilities, the allowed maximum quantity of lethal supertoxic substances for protective purposes and the industrial production of organophosphorous substances (thus covering the production of binary weapons). If suspicions of convention violations by another party can be "sufficiently proved" (p.20), then a party may request a special

check by a Standing Consultative Commission. Inspections would be carried out in such a way as to protect the business and production secrets of chemical companies. The merits of all of these proposals were attested to by the fact that many of them were incorporated into a United States working paper which summarizes the possible contents of a chemical weapons convention (see "United States detailed views on the contents of a chemical weapons ban", CD/343, 10 February 1983 (abstract P33(G83))). It is also encouraging that the Soviets agreed to the possibility of carrying out systematic international on-site inspections on the basis of an agreed quota (see "Basic provisions of the convention on the prohibition of the development, production and stockpiling of chemical weapons and their destruction", CD/294, 21 July 1982 (abstract N15(G82))), but this is limited to the destruction of stocks and to the production of supertoxic lethal chemicals. The Soviets must show flexibility on the inspection of the destruction and dismantling of production facilities and of potential production facilities of organophosphorous substances.

C99(A83)

C99(A83)

Proposal Abstract C99(A83)

1. Arms Control Problem:

- Chemical weapons - production
- stockpiling
- destruction of stocks
- destruction of facilities
- use

2. Verification Type:

- (a) On-site inspection - selective
- (b) Short-range sensors
- (c) Literature survey
- (d) International exchange of information
- (e) International control organization
- (f) National self-supervision

3. Source:

Ooms, A.J.J. "Will an Adequate Verification Scheme of a CW Convention be Viable?" In Compliance and Confirmation: Political and Technical Problems in the Verification of Arms Control of Chemical Weapons and Outer Space, pp. 40-46. Edited by H. von Riekhoff. Ottawa: Norman Paterson School of International Affairs, Carleton University, 1986.*

4. Summary:

This is a review of the various stages at which a chemical warfare convention may be verified. The development, production, stockpiling, transfer, use and capabilities of chemical weapons are each examined in turn, and in each case the role of a National Implementation Organ (NIO) and an International Verification Organ (IVO) are considered. The structure of the NIO will vary from nation to nation, while the IVO should either be part of a consultative committee from all nations or be 'imbedded' in the UN Secretariat.

It is proposed that the development of chemical weapons may be monitored through a combination of systematic literature searches conducted by the IVO and contributions of information by the NIOs or nations themselves. With regard to production, those facilities dedicated solely to the manufacture of chemical weapons could be dismantled completely, and this could be fairly easily verified using on-site inspection by both personnel and remote devices. The civil chemical industry would require a completely different verification scheme, given the dual purpose of some chemicals and the size of the industry. It could be monitored by ascertaining which firms actually

* Proceedings of a conference held in 1983.

produce and manufacture key chemicals, and then inspecting these plants on a random basis with a greater emphasis on larger plants.

The destruction of stockpiles is fairly easy to verify, but it remains difficult to ascertain whether they exist. The clandestine transfer of chemical weapons from one country to another is also fairly difficult to verify, but may be monitored at the earlier stages of production and stockpiling. Finally, the actual use of chemical weapons must be verified; while this is not too difficult, there are a number of organizational problems which must be overcome.

These proposals are then summarized by noting that it will ultimately be very difficult to verify the development, secret stockpiling and capabilities of chemical weapons. However, verification is possible where stockpiles are destroyed and in order to monitor non-production. While the task will remain difficult, it will still help to build confidence and reinforce any chemical weapons convention.

C100(A83)

C100(A83)

Proposal Abstract C100(A83)

1. **Arms Control Problem:**

- Chemical weapons - production
- stockpiling
- destruction of stocks

2. **Verification Type:**

On-site inspection - selective

3. **Source:**

Summerhayes, David. "Chemical Weapons: Postures, Plans and Prospects For Control". ADIU Report 5, no. 6, (November/December 1983).

4. **Summary:**

This article looks at the current status of negotiations for a chemical weapons convention. The development of chemical weapons is reviewed, and existing stockpiles are described so far as is known.

A chemical weapons convention has been on the United Nations agenda since 1968, but agreement has evolved slowly for a number of reasons. This is partly due to a lack of political will, since any progress depends primarily on agreement between the United States and the Soviet Union. Difficulties in providing for adequate verification and determining the scope of an agreement have also served to delay the process. "Unfortunately, technical means of verification are of only marginal utility in the current state of the art, and even this type of system would require periodic on-site inspection of its functioning installations" (p.2). The situation has marginally improved in recent years, as the Soviet Union has become more open to the use of on-site inspection. In 1982, the USSR tentatively proposed that provisions be made for systematic on-site inspection of the destruction of existing stockpiled chemical weapons. It was also proposed that the production of super-toxic chemicals for permitted purposes be subject to similar supervision. The United States has in turn become more willing to discuss the scope or substantive content of an agreement prior to any decision on verification measures. Despite these advances, however, problems remain; "The Soviet proposal says nothing on the important question of on-site verification of the general cessation of production" (p.2).

Some of the difficulties inherent in formulating an agreement of this sort are discussed. The process is complicated by the number of negotiating partners involved, and the fact that verification requirements for a chemical weapons treaty are at "the outer limits of technical and political capabilities". Finally, even the most trifling administrative details must be considered prior to agreement, since both sides will only accept a treaty which is complete. It is recommended that negotiators strive to find a "satisfactory middle path" which simultaneously acknowledges this complexity and persuades governments to be reasonable in their demands.

C101(G83)

C101(G83)

Proposal Abstract C101(G83)

1. Arms Control Problem:

Chemical weapons - production

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
 - obligatory
- (b) International control organization
- (c) International exchange of information - declarations

3. Source:

United Kingdom. "Verification of non-production of chemical weapons". CD/353, 8 March 1983.

See also: - United Kingdom. "Verification of non-production of chemical weapons". CD/CW/WP.86, 10 August 1984.

- United States. CD/PV.204, 17 March 1983.

- Italy. CD/PV.227, 12 July 1983.

4. Summary:

This paper aims to demonstrate that regular inspections to verify the non-production of chemical weapons need not be onerous to the chemical industry. The proposed verification regime includes:

- (1) declarations of facilities producing chemicals necessary for the manufacture of chemical weapons (a non-definitive list of these chemicals is appended to the paper in an annex),
- (2) periodic random selection of a number of the declared facilities for on-site inspection, and
- (3) on-site inspections under the authority of the Consultative Committee.

Countries failing to make a declaration of facilities and their locations would be subject to special inspections. The random nature of regular inspections would have a deterrent value because facilities recently inspected could again be subject to inspection under a system of drawing lots. A period of one week from the time of selection is suggested as the schedule for inspection to prevent facilities from being quickly modified. Bureaucratic delays such as refusal to grant entry visas to inspectors would be taken as prima facie evidence of a breach of the convention. Independent technical inspectors assisted by a permanent technical secretariat would be responsible to the Consultative Committee. Specific inspection procedures would be established by the convention.

The paper addresses the problem of dual purpose chemicals by suggesting that there should be a requirement for a declaration of all facilities producing dual purpose chemicals in amounts above a certain level and an indication of their civil use.

The paper notes that since the inspections proposed would affect only a few facilities producing super-toxic chemicals, the verification regime would not be a burden on the chemical industry. Consultations between the British Government and the British civil chemical industry concerning the proposed inspections suggested that satisfactory arrangements could be arrived at.

5. **Selected Comments of States:**

A number of countries responded to the United Kingdom's suggestion in CD/353 that other states should furnish data on production and civil use of key precursors of chemical warfare agents. The results of most of these responses are summarized in a table presented by the United Kingdom in CD/CW/WP.86. For the responses of each country see the following papers:

United States. CD/CW/WP.52, 30 June 1983.

Italy. CD/PV.227, 12 July 1983.

Norway. CD/397, 19 July 1983.

Netherlands. CD/CW/WP.59, 18 January 1984.

Belgium. CD/CW/WP.63, 27 January 1984.

France. CD/CW/WP.65, 31 January 1984.

Denmark. CD/537, 17 August 1984.

Australia. CD/541, 9 October 1984.

Spain. CD/585, 2 April 1985.

The United States (CD/PV.204, 17 March 1983) supports the method proposed by the United Kingdom.

Italy (CD/PV.227, 12 July 1983) notes that information from delegations suggests that the verification method proposed by the United Kingdom would be both possible and adequate and would not impose an excessive burden on the civilian chemical industry. It rejects the idea of having on-challenge inspections which can be refused; routine on-site inspections would be more useful and "would not have a political connotation". Verification of dual purpose chemicals could be supplemented by the periodic publication by states of statistical data on the amounts of these chemicals which are produced, exported, imported and consumed.

C102(A85)

C102(A85)

Proposal Abstract C102(A85)

1. Arms Control Problem:

- Chemical weapons - production
- stockpiling
- destruction of stocks
- destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
 - random
 - challenge
- (b) Short-range sensors - monitoring devices
- (c) Records monitoring - plant
- (d) International control organization
- (e) International exchange of information - declarations
- (f) Complaints procedure - referral to United Nations

3. Source:

Elbe, Frank. "Verification Aspects of Future Treaty Banning Chemical Weapons: Stock-taking of the Negotiations at the Geneva Conference on Disarmament". Paper based on the original published in Desterreichische Militarische Zeitschrift. (January 1985).

4. Summary:

Elbe states that, "adequate provisions for verification must be included in any future chemical weapons treaty...because of the disproportionately great military significance that such weapons have" (p.1). In this paper, he reviews the CD negotiations concerning a chemical weapons convention paying particular attention to the issue of verification. He notes where the parties agree on certain issues and points out the obstacles which need to be overcome.

Since mid-1983 there has been agreement in principle that the convention should ban the use of chemical weapons. Sweden, however, wants to go further and include a ban on acts preparatory to waging chemical warfare. This would create verification problems because such acts are indistinguishable from protective measures against chemical weapons.

The members of the CD have basically agreed to define chemical weapons as super-toxic lethal, other lethal or other harmful chemicals as well as definitions relating to munitions and means of delivery for these agents. However, they have not agreed on whether to include herbicides and chemical agents for law enforcement in the ban. A "general purpose criterion" regarding the scope of the convention would permit the use of toxic chemicals for industrial, scientific, agricultural, medical and law enforcement purposes, but this poses difficulties for verification. A purpose criterion creates a legal

distinction, but this would still mean that one and the same chemical could be considered a chemical weapon or not - depending on the purpose for which it is to be used.

Verification provisions of a future convention would cover the following areas: the systematic international inspection of the destruction of current chemical weapons stocks; the elimination of production facilities for chemical weapons; permitted production of agents for protective purposes; and non-production in the chemical industry. Challenge inspections would investigate suspected violations of the convention.

National technical means of verification would not be adequate to verify a chemical weapons convention because satellites cannot monitor the activities inside production facilities. Therefore, intrusive measures of verification are necessary. These measures are often resisted by Eastern bloc countries and Third World countries as well as some highly industrialized Western nations who dislike the idea of inspection of their civilian chemical industry.

The issue of verification of the destruction of chemical weapons appears to have been resolved as the parties have agreed to systematic international inspection consisting of continuous monitoring with instruments and constant systematic international on-site inspections. Workshops on verification of the destruction of chemical weapons have demonstrated that such a combination of inspection methods need not pose an onerous burden for the parties. Verification of the destruction of production facilities can also be accomplished by a combination of monitoring instruments and international inspections. Random inspections could verify that no chemical weapons are being produced. These inspections would apply to the manufacture of key precursors which could be used to produce chemical weapons. These inspections should be preformed in such a way so as not to threaten industrial secrecy and should not be prohibitive in terms of cost.

The problem of verifying initial declarations of stockpiles which may be kept at sensitive military facilities can be overcome by having parties move the stocks to a less sensitive location to make declarations.

Under a convention, parties would be permitted to produce and utilize lethal chemicals and their key precursors for testing protective equipment. The permitted amount for possession should not exceed one metric ton and the productive capacity of a single specialized facility for this purpose should not exceed a maximum agreed upon. Signatories would agree to subject this facility to systematic international inspection by an annual data report, on-site instruments and systematic international on-site inspections.

Challenge inspections in the case of a suspected violation of the convention present the most significant problem which must be resolved. There is no precedent for this sort of inspection in any existing arms control agreement. Three approaches to this issue have been taken in the CD. The US has called for a far-reaching provision for rapid inspection on a challenge basis under Article V of its draft

convention (See CD/500, abstract C79(G84)). The Americans have been criticized for this demanding approach, but critics ignore the scope of the measures to which the Americans are willing to subject themselves. The Soviet Union would allow parties faced with a request for an inspection to receive the request favorably or to "decide otherwise" (see CD/294, abstract N15(G82)). Elbe suggests that "the Soviet proposal is highly problematic because a state violating the convention would still be acting in agreement with the convention if it avoided an inspection" (p. 12). Another problem with the Soviet proposal is that a requirement for bilateral mutual consultation, which must be exhausted before a request for a challenge inspection can be made, could delay effective monitoring by the competent organ of the convention. A Brazilian proposal, however, would allow a state to refuse a request for an on-site inspection, but only for exceptional reasons which may involve, for example, national security considerations. The refusal must be accompanied by an explanation and the international control organ can issue a second request for an inspection after reviewing the explanation. If that request is refused, the consultative committee or any party to the convention may refer the matter to the appropriate body of the United Nations. The procedure following a refusal, in this approach, would discredit a party dealing in bad faith and would lead other parties to take appropriate measures in response.

C103(A85)

C103(A85)

Proposal Abstract C103(A85)

1. Arms Control Problem:

- (a) Chemical weapons - production
- (b) Any arms control agreement

2. Verification Type:

- (a) On-site inspection - selective
 - challenge
 - obligatory
- (b) Remote sensors

3. Source:

Lord, Carnes. "Rethinking On-site Inspection in US Arms Control Policy". Strategic Review 13, no. 2 (Spring 1985): 45-51.

4. Summary:

Lord assesses the value of on-site inspection ("negotiated inspection measures" or NIMs) with reference to four key functions of verification: (1) detecting violations of an agreement; (2) deterring non-compliance; (3) providing a basis for responding to evidence of violations and; (4) developing confidence in compliance. Lord also explores the linkage between national technical means of verification and on-site inspection. He suggests that NIMs will be useful when national technical means have a high probability of detecting a violation initially. Both types of verification thus reinforce each other.

NIMs are useful for confirming positive activities such as the destruction of weapons or installations and are better able to detect evidence of activity designed to conceal violations than to identify evidence of violations themselves. NIMs also have greater legitimacy and perceived reliability than NTMs in the view of western publics. However, this legitimacy can inhibit the efficiency of verification if the inability of on-site inspection to confirm a suspected violation is accompanied by hesitation to act in response to evidence gathered by national technical means.

With respect to verification of a chemical weapons convention, the consensus among American officials is that on-site inspection cannot effectively monitor an agreement because of the possibility of violations at undeclared production or storage sites. National technical means would be similarly unable to detect violations. The deterrence function of on-site inspection with respect to the USSR would also be limited. However, on-site inspection could be useful in detecting obstructive measures to hide violations. A mandatory inspection regime still faces many obstacles, particularly Soviet refusal to allow unjustified "espionage", a position which might receive some sympathy in the West. Even with mandatory on-site inspection, the problem of developing an effective post-detection

response remains. One possibility is a "safeguards" program which would involve a joint Congressional resolution to authorize the modernization of the American CW capability in response to a Soviet refusal of a mandatory inspection. Congressional failure to act would provide grounds for abrogation of the treaty by the President.

Chemical weapons - production

- (a) On-site inspection - selective
 - sampling
- (b) International exchange of information
- (c) Records monitoring - plant

Federal Republic of Germany. "Verification of the non-production of chemical warfare agents by means of inspections in the civilian chemical industry". CD/627, 1 August 1985.

This working paper covers the range of chemical substances involved in a chemical weapons convention, the scope of surveillance and the portions of the civilian chemical industry which would have to be inspected. The scope of substances to be covered includes agents usable exclusively for chemical warfare (single purpose agents), key precursors for their production and products that have both military and civilian uses, (dual purpose agents). Substances would be selected on the basis of toxicity and potential military threat.

The manufacture of supertoxic lethal chemicals for protective purposes would be permitted under special convention provisions, but only in limited quantities and in a declared separate facility for this purpose. Should these substances acquire a civilian significance justifying their production on an industrial scale, a state intending to produce these chemicals should notify the competent body under the convention. The manufacture and use of these substances would then be subject to systematic inspections.

The regime for verifying non-production should consist of an exchange of data and on-site inspections on a random basis in companies determined by lot which manufacture key precursors of supertoxic lethal chemicals. The FRG defines key precursors as "the precursors in the final technical reaction stage of the production of supertoxic lethal weapons which are characteristic for the toxicity of the end-product" (p.2). The exchange of data concerning the production and use of selected precursors will improve the effectiveness of inspections of dangerous supertoxic lethal chemicals. Reports of statistical data on dual-purpose lethal chemicals and other selected precursors will also be required. The production of chemical substances which are precursors of a number of civilian products as well as being used as chemical weapons themselves extends into thousands of tons and their potential military threat is limited, so an exchange of data on these substances would be costly and of little use.

Inspection procedures should be oriented towards the toxicity and potential threat of substances. The absence of the safety precautions necessary for the production of supertoxic lethal chemicals is sufficient proof that these substances are not being produced in the facility. Inspections of less toxic key precursors manufactured for civilian purposes must be more extensive and should focus on the crucial reaction phase. Inspections should be conducted on the basis of annual statistical data and if the total annual quantity produced exceeds one metric ton. Reviews of plant records, viewing of facility areas as well as sampling and analysis should all be used. Additional measuring instruments would appear to be unnecessary and impracticable. Inspections should also cover companies which receive key precursors in quantities which exceed one metric ton per year. Inspections should not survey the entire production process nor should they focus on relationships with buyers so as to avoid adversely affecting commercial and national economic interests.

C105(G85)

C105(G85)

Proposal Abstract C105(G85)

1. Arms Control Problem:

- Chemical weapons - production
- stockpiling
- destruction of stocks
- destruction of facilities
- binary agents

2. Verification Type:

- (a) On-site inspection - selective
- (b) International control organization
- (c) International exchange of information - declarations

3. Source:

Spain. CD/PV.323, 23 July 1985.

See also: - United Kingdom. "Verification of non-production of chemical weapons: Proposals for inspection procedures and data exchange". CD/575, 6 March 1985. (see P34(G85)).

- United Kingdom. "Chemical weapons convention: The organs and constitution of the organization". CD/589, 11 April 1985. (see P34(G85)).

4. Summary:

Spain supports the proposals contained in document CD/575 as a "basis for progress" in the verification of non-production of chemical weapons. The scope of a chemical weapons convention should extend to a ban on single purpose agents only. Parties should develop a list of these agents by consensus. Disputed agents could be accounted for by applying the general purpose criterion to them and including them on a separate list. Production of these agents for permitted purposes would not be restricted in quantity or number of facilities, but would be subject to very strict on-site inspection. Binary weapons should not be treated specially; their components agents should be treated as other agents are treated.

An inspection regime could be administered by an institutional organization modelled on the United Kingdom's proposals in CD/589. The Consultative Committee could update lists of supertoxic lethal agents and precursors subject to verification. Chemical and military experts should hold periodic meetings to identify agents to be included on those lists. The Executive Council should be established according to criteria of equitable geographical and political distribution, but should also include those nations which have made a positive declaration of production of chemical agents.

The destruction of stocks should proceed on the basis of how operational stocks are. Thus the oldest, obsolete stocks would be destroyed last.

C106(G85)

C106(G85)

Proposal Abstract C106(G85)

1. Arms Control Problem:

- Chemical weapons - production
 - stockpiling
 - destruction of stocks
 - destruction of facilities
 - binary agents

2. Verification Type:

- (a) On-site inspection - selective
- (b) Records monitoring - plant
- (c) International exchange of information - declarations
 - report to international body
- (d) International control organization

3. Source:

Sweden. "A comprehensive approach for elaborating regimes for chemicals in a future chemical weapons convention". CD/632, 20 August 1985.

See also: - Report of the Ad Hoc Committee on Chemical Weapons to the Conference on Disarmament. CD/539, 31 August 1984.

4. Summary:

This paper proposes an alternative approach to the declaration, elimination, production and verification of various regimes of chemical agents suggested in CD/539. Past approaches have suffered for the "loophole" that one and the same chemical might be subject to different measures, depending on the purpose of its production. The new approach attempts to place one chemical under the same regime in all parts of the Convention, i.e. as regards declarations, elimination, permitted production and verification.

The paper outlines three regimes for each of three groups of chemicals. Under the three regimes, verification provisions are the most stringent for Regime I, stringent but somewhat less burdensome for Regime II and the least stringent for Regime III. The first group of chemicals includes the following substances:

- (1) super-toxic lethal chemicals developed, produced or stockpiled for chemical weapons purposes;
- (2) super-toxic lethal chemicals which are found to be presumptive chemical weapons;
- (3) other lethal and harmful chemicals developed, produced or stockpiled only for chemical weapons purposes; and
- (4) key precursors with no use or very limited use for permitted purposes and key components of binary and/or multicomponent chemical weapons.

Regime I involves the declaration of all Group I chemical stocks and production facility locations within thirty days. All stocks and production facilities should be completely destroyed except if some Group I chemicals were to be retained for protective or possibly other permitted purposes. Production of Group I chemicals should be prohibited, but limited permitted production could take place at a single small-scale production facility. Verification of the destruction of stocks and of permitted production should be carried out by international on-site inspection.

Group II chemicals consist of:

- (1) super-toxic lethal chemicals (other than those in Group I) which are presently developed, produced or stockpiled for permitted purposes only but which could be used to produce chemical weapons in the future; and
- (2) key precursors (other than those in Group I) presently used for permitted purposes, but which have also been produced for chemical weapons purposes.

Under Regime II, parties would make declarations of Group II chemicals involving all key precursors in chemical weapons stocks, stocks for permitted purposes and aggregate annual production of each of the chemicals including their respective end uses. Key precursors should be eliminated either through destruction or diversion to permitted purposes. Facilities which have produced key precursors for chemical weapons purposes should be destroyed or dismantled if the total production capacity exceeds the amount permitted under the convention. Permitted production of Group II chemicals should occur at the single small scale facility specified in Regime I. Verification provisions for Regime II consist of data reporting and international on-site inspection.

Group III chemicals include:

- (1) other lethal chemicals used for permitted purposes, but which have also been produced for chemical weapons purposes;
- (2) other harmful chemicals used for permitted purposes, but which have also been produced for chemical weapons purposes; and
- (3) precursors.

Regime III requires declarations of all Group III chemicals in chemical weapons stocks, as well as stocks for permitted purposes and aggregate annual production of each of the Group III chemicals, including their respective end uses. Facilities should be declared if they have been used for production of Group III chemicals for chemical weapons purposes or if production exceeds certain quantities. Chemical weapons stocks containing Group III chemicals should be destroyed or diverted to permitted purposes. Facilities which have produced these chemicals for chemical weapons purposes should be destroyed if their production capacity exceeds the amount permitted under the convention. Verification under Regime III would consist of data reporting on each individual chemical and systematic international on-site inspection.

A national team should verify large scale civil production facilities or industrial facilities so that their working is not hampered (see CD/482, abstract N17(G84)). This team would submit reports to the international organization. If the organization has doubts about the report and the production process, it may inspect the facility on a challenge basis.

C107.1(G86)

C107.1(G86)

Proposal Abstract C107.1(G86)

1. **Arms Control Problem:**
Chemical weapons - production
2. **Verification Type:**
 - (a) On-site inspection - selective
 - obligatory
 - challenge
 - (b) International exchange of information
3. **Source:**
France. CD/PV.353, 3 April 1986, pp.30-31.

4. **Summary:**

France felt that the principal difficulty in reaching an agreement on a chemical weapons convention lay in the verification of non-production. It was essential to provide for the organization of international on-site inspections, or routine inspections, and also for a regular exchange of statistical information which would make it possible, in the large majority of cases, to ensure that there was no diversion for chemical weapons production purposes of a number of substances produced in varying amounts by the civilian chemical industry. The use of on-challenge inspection should be confined to exceptional cases. Facilities to be subject to routine international on-site inspection should be determined by lot.

For other widely used chemicals a regular exchange of statistical data would provide the basis for control. Large variations from one year to another might, in the absence of satisfactory explanations, prompt on-site inspection to ensure that no violation had taken place. In some cases the on-site recording of data concerning production and stockpiling by automatic devices could be considered. Conversion of former production facilities to peaceful purposes would only be acceptable if accompanied by especially strict verification measures. These must include international on-site inspection to ensure that there was no prohibited reuse of shops or parts of facilities which had previously served for the production of prohibited substances. The production of limited amounts of prohibited chemicals should be strictly supervised, including by on-site inspections.

C107.2(G86)

C107.2(G86)

Proposal Abstract C107.2(G86)

1. Arms Control Problem:

Chemical weapons - production

2. Verification Type:

On-site inspection - selective

3. Source:

Netherlands. "Verification of the non-production of chemical weapons: Report on the workshop on the verification of a chemical weapons ban, held in the Netherlands from 4 to 6 June 1986". CD/706, 20 June 1986.

4. Summary:

The report presented a few tentative conclusions, which did not necessarily represent the views of the Netherlands Government, but which might serve as a contribution to the negotiations on an adequate system of verification of non-production. They are:

- (1) The chemical industry is accustomed to inspections.
- (2) Familiarization visits to the facilities are essential.
- (3) No single scenario could be applied for all routine inspections.
- (4) Waste water analysis can aid in verification, but not always to the same degree.
- (5) Highly qualified inspectors will be needed.
- (6) Verification of non-production is possible at acceptable costs.

1. Arms Control Problem:
Chemical weapons - production
2. Verification Type:
On-site inspection - selective
 - challenge
3. Source:
United Kingdom. "Chemical weapons convention: Verification and compliance - The challenge element". CD/715, 15 July 1986.
4. Summary:

The United Kingdom proposed that each state party to a CW convention would have the right, in exceptional circumstances, to directly request a challenge inspection of another. The challenged state would then be under an obligation to demonstrate to others, and especially the challenging state, that it remained in compliance. It would be required to meet its obligation quickly by allowing a comprehensive investigation of the issue relating to compliance. However, in very limited circumstances there would be a right of refusal of direct inspection. In those circumstances a challenged state would propose alternative measures which would enable the matter under consideration to be resolved.

C108(G72)

C108(G72)

Proposal Abstract C108(G72)

1. Arms Control Problem:

Chemical weapons - stockpiling

2. Verification Type:

On-site inspection - selective

3. Source:

United States. "Working paper on storage of chemical agents and weapons". CCD/366, 20 June 1972.

4. Summary:

The paper is based on US experience in storing CWs. It describes a number of the features of such storage facilities which may help to distinguish them from facilities for storing other munitions or chemicals. Three general characteristics are discussed:

- (1) Physical security: Generally, there is nothing unique to CW storage facilities in this regard apart from special warning signs, guards with protective masks, and air sampling devices.
- (2) Maintenance of stocks to prevent deterioration: Again there is nothing peculiar to a CW facility in this regard which could not be easily hidden.
- (3) Precautions for protection and treatment of personnel in case of accident: This can be achieved by regulating access to facility, providing protective clothing and decontamination facilities, and ensuring quick access to medical services.

The general conclusion reached is that while some indications may be visible under certain circumstances, it is difficult even when in close proximity to the CW storage facility to distinguish it from other types of storage facilities. Those features which are unique could be readily hidden if desired. Thus, it is questionable whether any of these features will be of much help in formulating a reliable system of verification.

C109(A83)

C109(A83)

Proposal Abstract C109(A83)

1. Arms Control Problem:

- Chemical weapons - stockpiling
- production
- destruction of stocks
- use

2. Verification Type:

- (a) On-site inspection - selective
- (b) International exchange of information

3. Source:

Murray, Blair L. Chemical Weapons Arms Control: Prospects for Disarmament. In Compliance and Confirmation: Political and Technical Problems in the Verification of Arms Control of Chemical Weapons and Outer Space, pp. 50-52. Edited by H. von Riekhoff. Ottawa: Norman Paterson School of International Affairs, Carleton University, 1986.*

4. Summary:

This article traces the 1970s efforts to formulate a bilateral arms control agreement restricting the production and use of chemical weapons. Talks were initiated in 1977 and a number of issues were tentatively resolved. The United States and the Soviet Union had agreed to the scope of an agreement, the criteria for determining those categories of weapons which were to be restricted, and provisions regarding the acquisition and sale of chemical weapons. The substance of this agreement actually provided for complete disarmament in chemical weapons. The substance of this agreement actually provided for complete disarmament in chemical weapons, and was remarkable in that provisions were made for verified disarmament; "Of greatest precedential significance for arms control was the agreement that countries would ... destroy stocks of existing chemical weapons and verifying that destruction" (p.3).

Progress was halted in 1978, however, as the two sides were unable to find a mutually acceptable means of verifying the agreement. While both had agreed in principle to the use of national and international means of verification, the Soviet Union consistently rejected US proposals for on-site inspection, declarations of stockpiles and the exchange of information. The Soviet Union offered no realistic alternative to the proposals they had rejected. Bilateral negotiations were consequently stymied, and the US was accused of having obstructed progress in arms control with their insistence on adequate verification. Now the US has agreed to multilateral negotiations for a chemical weapons treaty. This may

* Proceedings of a conference held in 1983.

expedite agreement by placing additional international pressure on the Soviet Union, and will also include other countries which possess or are capable of producing chemical weapons.

A chart is included which provides a detailed comparison of US and Soviet positions on various aspects of a comprehensive chemical weapons ban. In each instance, the Soviet Union and US differ on their respective provisions for verification and a general concern for the effectiveness of the treaty. It is not clear how the Soviet Union will be able to provide adequate verification of the destruction of stockpiles without some form of on-site inspection, yet no provisions are made; they discuss only the 'possibility' of some form of on-site inspection.

The Soviet refusal to accept verification proposals acted to delay agreement while US stockpiles were continually deteriorating. It is possible then, that the Soviets never intended to conclude an agreement, and were simply stalling until an agreement was no longer necessary from their point of view (i.e. when US stockpiles would no longer pose a threat to the Soviet Union). The author states that the US is seriously pursuing a chemical weapons ban, but an 'effective guarantee' for compliance must precede disarmament.

C110(G85)

C110(G85)

Proposal Abstract C110(G85)

1. Arms Control Problem:

- Chemical weapons - stockpiling
- production
- destruction of stocks
- destruction of facilities

2. Verification Type:

- (a) On-site inspection - selective
- (b) Short-range sensors - seals
- (c) International control organization
- (d) International exchange of information - declarations
- (e) National self-supervision

3. Source:

France. "Chemical weapons: elimination of stocks of chemical weapons; irreversible neutralization of means of production". CD/630, 5 August 1985.

See also: - France. "Elimination of stocks and production facilities". CD/494, 3 April 1984 (see abstract C77(G84)).

4. Summary:

France proposes a ten year programme for the destruction, or reallocation to peaceful uses of chemical weapons stockpiles and production facilities under a chemical weapons convention. This would involve the elimination of stocks of chemical weapons and the liquidation of production facilities, but should be done in such a way as to preserve the security balance between states.

The first stage of the process would involve very detailed declarations of the type and amount of chemical warfare agents contained in stockpiles and the location, substance manufactured and theoretical production capacity of facilities. The location of stocks would not have to be declared at the time of entry into force of the convention so that national security would not be jeopardized. The other declarations would be made two months after the entry into force of the convention.

Once a destruction site has been established and the possible transformation of production sites into destruction facilities has been determined, a team of international inspectors would place seals on production facilities and the transformations would be carried out under international control. Parties would then establish national and international control systems and gather stocks to be destroyed at destruction sites. Parties would also declare which facilities will be converted to the manufacture of civilian products.

Two years after the entry into force of the convention, destruction and conversion would commence. France suggests the following order, based on lethality, for the destruction of stocks:

- (1) (a) munitions containing lethal toxic substances (phosgene, cyanogen chloride, hydrocyanic acid etc.);
(b) toxic chemicals in bulk;
- (2) (a) munitions containing incapacitating agents (yperites);
(b) incapacitating agents in bulk;
- (3) (a) munitions containing neurotoxic chemicals and key precursors; and
(b) neurotoxic chemicals in bulk.

This particular order has been selected to preserve the security balance. Priority destruction of neurotoxic chemicals would enhance the value of stocks of lethal chemicals and upset the balance. Furthermore, detection of the diversion of these lethal chemicals from industrial use to military use during the ten year destruction period would be difficult if these agents were still permitted through the early phases of the destruction process.

International inspection teams would conduct on-site inspections to verify destruction and conversion. The inspection team would be present during the entire destruction campaign, but would not need to remain during periods between phases of destruction and conversion. Converted facilities would be subject to routine inspections.

After eight years from the date of entry into force of the convention, the production capacity of all parties must be reduced to zero. At this point, stocks of chemical weapons of the two major powers must not exceed the equivalent of 4,000 t of neurotoxic substances; other countries must not possess more than 1,000 t of neurotoxic substances. After ten years, parties must make a "solemn declaration" that stocks have been totally destroyed and that production facilities have been completely eliminated. The international control organ must make a "solemn declaration" about the "definitive elimination of military capability in chemical warfare" (p.16).

C111(G82)

C111(G82)

Proposal Abstract C111(G82)

1. Arms Control Problem:

Chemical weapons - use

2. Verification Type:

On-site inspection - selective
- sampling

3. Source:

Norway. "Working paper on verification of a chemical weapons convention - sampling and analysis of chemical warfare agents under winter conditions". CD/311, 11 August 1982.

See also: - Norway. "Working paper: Verification of a chemical weapons convention - sampling and analysis of chemical warfare agents under winter conditions". CD/396, 19 July 1983.

- Norway. "Working Paper: Verification of a chemical weapons convention: Procedures for verification of alleged use of chemical weapons". CD/703, 16 June 1986.

- Abstract C118(G85).

4. Summary:

This paper summarizes the results of a research report on technical aspects of sampling and analysis. The main goal of the research programme was to focus on some of the verification problems the Consultative Committee will have to solve. One such problem is dealing with the climatic conditions and terrain of the contaminated area. The research programme concentrated on sampling and identification of chemical warfare agents in snow- or ice-covered ground at subzero temperature.

The study found that the amount of chemical agent from an attack will rapidly decrease with time depending on weather conditions. Wind speed is the dominant factor. The study also found that chemical agents decompose faster in snow than in water. The firm identification of the identity of an agent is thus dependent on the time factor and weather conditions, but analysis of snow samples can permit identification as much as two weeks after a chemical attack and even, in some cases, more than four weeks after an attack. Snow samples should be collected from the top 10cm layer below the original snow surface because none of the chemical agents tested penetrated deep into the snow, even after a long time.

In working paper CD/396, Norway summarizes the results of a second phase of its research. Tests with the riot control agent CS showed that, under winter conditions, the stability of different chemical agents varies. This influences the possibility of verifying the use of chemical agents. Rapid decomposition of agents in the

natural environment necessitates that sampling take place as soon as possible after a report on alleged use has been received. Trained personnel and sophisticated equipment should be employed to ensure the integrity of the samples and the reliability of results. Modern equipment is commercially available to facilitate proper identification. The paper also lists the chemical warfare agents which were found to be relatively stable in tests.

CD/703 presents additional proposals concerning procedures for verification of CW use, specifically procedures for sample handling by a fact-finding team in the field on an all-year basis. The main purpose is to establish sampling handling procedures which do not require highly trained personnel and advanced equipment. The paper is based on a detailed research report tabled as CD/702 (16 June 1986).

* Proceedings of a conference held in 1983.

alleged incident occurred and arrange a meeting with the local authorities. They should discuss the details of the attack, the work program of the team itself and all security and logistical support measures which will be required. The investigation itself should begin with a search for remnants of ammunition and chemical substances and the collection of samples of suspected materials. Interviews with people who have suffered casualties should follow, and should be supplemented by physical examination, blood and urine sampling as well as a perusal of medical records. Further provisions are made for administration: the tasks of the investigative body are explained, their administrative duties are outlined, and some description is given of the appropriate order and kind of questioning to be conducted.

C113(A83)

C113(A83)

Proposal Abstract C113(A83)

1. Arms Control Problem:

- Chemical weapons - use
- production

2. Verification Type:

- (a) On-site inspection - selective
- (b) Complaints procedures

3. Source:

Flowerree, Charles C. "Chemical Weapons: A Case Study in Verification". Arms Control Today 13, no. 3, (April 1983).

4. Summary:

The problems associated with the verification of compliance with a chemical weapons agreement and, in particular, with the Geneva Protocol of 1925, are discussed in this article. It examines the incidents which were alleged to have occurred in Laos and Afghanistan, and in particular, looks at the investigation of the Afghanistan case as the first 'fact-finding' effort which has been made to verify compliance. Some of the difficulties which arose in setting up this investigation were traced. Initial acceptance of this investigation was slow, starting with the incorporation of the appropriate language into the report of the Committee on Disarmament and the subsequent adoption of a resolution in 1980 after heated debate. Problems were encountered in the search for a suitable group of qualified experts, and the investigations of that group were hampered by procedural difficulties and the intractability of the authorities in states accused of violations. The findings of the investigators did not reveal any substantial proof that violations had occurred, but did produce some circumstantial evidence pointing to the probable use of chemical weapons.

The effectiveness of this investigative body was limited in part by its mandate; it could not make recommendations, and it was required only to raise the matter with the Security Council. Under the existing legal regime, assurance of compliance depends entirely on the self-interest of the parties and the pressure of world opinion, and this is deemed to be insufficient. Consequently, this issue must remain clouded so long as government unwillingness prevents any certain means of verification.

In conclusion, some suggestions are made to improve procedures for the verification of compliance. General Assembly Resolution (37/98d) was passed asking the Secretary General to: "(1) undertake investigations of any reports of violations of the protocol; (2) draw up a list of qualified experts who could be regularly available to conduct investigations; and (3) appoint a committee of experts to

study the question of procedures for conducting investigations of reported violations of the protocol" (p.3). This was accompanied by Resolution (37/98c) requesting a conference on compliance provisions for the Biological Weapons Convention. Despite such actions, however, success will ultimately rest on negotiations between the Soviet Union and the United States. Agreement is not likely here, but some recent developments in verification technology make prospects for verifiable arms control a 'little less bleak'. A majority of nations in the UN have in principle given their support for more effective verification, and this commitment should be directed towards practical measures.

C114(A83)

C114(A83)

Proposal Abstract C114(A83)

1. Arms Control Problem:

Chemical weapons - use
 - production

2. Verification Type:

- (a) On-site inspection - selective
 - sampling
- (b) Short-range sensors - sampling

3. Source:

Miettinen, J.K. "A Neutral View on Chemical Warfare and Arms Control". In Chemical Weapons and Arms Control: Views from Europe, pp. 32-41. Rome: Centro di Studi Strategic, June 1983.

4. Summary:

The author reviews several topics connected with the use of chemical weapons including: the stalled negotiations in the Committee on Disarmament; inconclusive evidence of the use of chemical weapons in Indochina and Afghanistan; ambiguous evidence of the presence of biological agents in the Sverdlovsk incident in the USSR; and the ineffectiveness of a chemical weapon deterrent.

The author notes that a small country such as Finland can make a contribution to promoting chemical disarmament. Since 1971 Finland has conducted a research project on the analytical verification of chemical warfare agents. The results of this project have been recorded in a series of working papers and "Blue Books" (see abstract I9(G79)). The creation of an accurate and sensitive verification system which can produce unambiguous information and can be used even by technically less developed countries requires a number of years of systematic work. Verifying the production of chemical weapons agents (in violation of a ban) is more difficult than verifying battlefield use of chemical weapons because no casualties exist in the former case. Environmental samples from different phases of a production process, solid wastes or waste waters may be useful for verification of production. If data are recorded in digital form, then unambiguous computerized comparison of samples with reference data for prohibited compounds is possible. However, if the results of analysis are so complex that they can be interpreted only by experienced chemical weapons chemists then their usefulness is limited because they are likely not completely unambiguous.

The Finnish Blue Books have described the application of several highly sensitive instrumental techniques and explored the possibility of their automation in order to improve the reliability of the identification of individual compounds. A 1980 study covered the identification of the degradation products of all important nerve

agents (see "Identification of degradation products of potential organophosphorous warfare agents", CD/103, 24 June 1980 - abstract I9(G79)). The 1981 "Blue Book" presented a comprehensive approach to the environmental monitoring of nerve agents (see "Trace analysis of chemical warfare agents: an approach to the environmental monitoring of nerve agents", CD/196, 16 July 1981 - abstract I9(G79)) and the 1982 study applied the same automatic methods to the 20 most important non-phosphorus agents (see "Systematic identification of chemical warfare agents: identification of non-phosphorus warfare agents", CD/299, 29 July 1982 - abstract I9(G79)). The 1983 "Blue Book" will discuss the identification of precursors of nerve agents, of a few classical and other potential non-phosphorus CW agents and the degradation products of adamsite, lewisite and mustard. Future topics will include:

- (1) the further development of the sensitivity and specificity of mass spectrometry;
- (2) remote air sampling and analysis;
- (3) automatic "black box" monitoring of agent destruction facilities (incinerators);
- (4) the operation of transportable and mobile laboratories; and
- (5) immunological analytical methods applied to warfare agent monitoring.

Chemical weapons - use

(a) On-site inspection - selective
- sampling

- (b) Complaints procedure - referral to Secretary General
- referral to General Assembly

Sutherland, R.G. Verification of Chemical Weapon Use: Prospect.
Paper presented at the Arms Control Verification Symposium, Carleton
University, Ottawa, Ontario, 6-8 June 1983.

This article deals with the task of verification where a breach is alleged to have occurred. It begins with a brief history of chemical weapons, a description of the various chemical agents, and the international treaties governing their use. Some of the problems encountered in the United Nations' investigation of alleged incidents involving chemical weapons use are then considered, among them the difficulty of gaining access to the site of the incident, language and cultural differences, and the problem of obtaining and analyzing samples. The UN resolution which provides for such investigation is also reviewed, and the significant sections are highlighted. It is established that there is a need for a forum to review complaints, a separate mechanism to collect evidence, an available group of experts to conduct investigations, and yet another group to assess the evidence and judge it accordingly.

A procedure is proposed which would accommodate this division of tasks. It is suggested that the Secretary General of the UN make the initial decision of whether or not to proceed with an investigation. A separate peacekeeping force would then provide experts to conduct various kinds of investigation. The evidence they produce would be sent back to the Secretary General, who would in turn have this information evaluated by yet another body of experts. The final report would then return to the General Assembly of the UN, where a judgment of the evidence would be made.

This procedure is advantageous in that it provides for the collection of evidence by a neutral body, and also prescreens the data so that it may be evaluated by the appropriate group of experts.

C116(A84)

C116(A84)

Proposal Abstract C116(A84)

1. **Arms Control Problem:**
Chemical weapons - use
 - production
2. **Verification Type:**
On-site inspection - selective
3. **Source:**
Heyndrickx, A., ed. New Compounds in Biological and Chemical Warfare: Toxological Evaluation. Proceedings of the First World Congress on Biological and Chemical Warfare, Ghent, Belgium, 21-23 May 1984.
4. **Summary:**
This text contains the proceedings of the First World Congress on Biological and Chemical Warfare which was held in Belgium in May of 1984. It consists of about 60 submissions on the nature and effects of various toxic agents, dealing primarily with the properties of these substances or the medical phenomena that they produce. Most of these papers are technically complex and quite specific, and are supplemented by numerous graphs, charts and tables. Verification is not the subject of this analysis as such, but the papers provide important information regarding evidence of chemical weapons use. On the basis of these studies, it may be possible to distinguish mycotoxins (those toxins naturally produced in the environment) from man-made chemical weapons. This research is also helpful in determining key substances in chemical compounds, both for the purposes of identifying chemical weapons use and for verifying compliance with a ban on chemical weapons production.

C117(A85)

C117(A85)

Proposal Abstract C117(A85)

1. **Arms Control Problem:**

Chemical weapons - use

2. **Verification Type:**

On-site inspection - selective

3. **Source:**

Sutherland, R.G. "The Bhopal Catastrophe - Lessons To Be Learned Concerning Investigations of the Use of Chemical Weapons". In: Highly Toxic Chemicals: Detection and Protection Methods; Proceedings of a Symposium, pp. 155-165. Edited by H.B. Schiefer. Saskatoon, Saskatchewan: Toxicology Research Centre, University of Saskatchewan.

4. **Summary**

The paper examines whether the Bhopal (India) incident of 2 December 1984 can help in the development of procedures for verifying allegations of use of chemical weapons as well as the ways in which disasters involving highly toxic chemicals may be dealt with by international agencies. The author first compares and contrasts Bhopal with incidents where CWs were allegedly used (in particular South East Asia and Iran/Iraq). He then outlines some of the international debate on the verification of CW use.

The author next discusses the basic similarities between a CW incident and an accidental release of a toxic chemical. He concludes that the procedures and requirements for investigation for both events are similar. Moreover, any international organization dealing with the control of CWs and with links to national organizations with a similar mandate would be "in an ideal position to render assistance to victims of a toxic chemical release" (p.163) even if only through a databank on toxic chemicals and antidotes.

C118(G85)

C118(G85)

Proposal Abstract C118(G85)

1. **Arms Control Problem:**

Chemical weapons - use

2. **Verification Type:**

- (a) On-site inspection - selective
 - challenge
 - sampling
- (b) International control organization
- (c) Non-physical/psychological inspection

3. **Source:**

Norway. "Working Paper: Verification of Alleged Use of Chemical Warfare Agents Under Winter Conditions". CD/601, 20 June 1985.

See also: - Series of Norwegian working papers: CD/311, 11 August 1982 (See abstract C111(G82)); CD/396, 19 July 1983 (see abstract C111(G82)); CD/508 and CD/509, 15 June 1984; CD/598 and CD/600, 20 June 1985; CD/702, 16 June 1986.

- Abstract C111(G82).

4. **Summary:**

In this working paper, Norway proposes procedures which could be used by a fact-finding team (under the Consultative Committee established by a chemical weapons convention) when investigating the alleged use of chemical weapons under winter conditions. The procedures are based on the results of Norway's field experiments (see documents CD/311, CD/396, CD/508, CD/509, CD/598 and CD/600).

The fact-finding team should undertake on-site inspections on challenge to verify or disprove the use of chemical warfare agents. The team should consist of:

- (1) a military expert,
- (2) a chemist,
- (3) a medically qualified person,
- (4) an interpreter,
- (5) an explosive ordinance disposal expert, and, in some circumstances,
- (6) a sociologist, ethnologist or cultural anthropologist with knowledge of the people living near the target area and their cultural characteristics.

The team should collect snow samples and blood and tissue samples from people claiming to be victims of a chemical attack. The team should also interview alleged victims. A portable vapour detector may give a general indication of the area from which snow samples should be taken. The government of the country being inspected should identify the area to be inspected. Control samples should be taken from outside the contaminated area for comparison. The investigation should be conducted as soon as possible, and no later than four weeks after a report of alleged use has been received by the Consultative Committee.

An annex to the paper proposes a list of equipment for the inspection team.

C119(A82)

C119(A82)

Proposal Abstract C119(A82)

1. Arms Control Problem:

Other weapons of mass destruction - radiological weapons

2. Verification Type:

- (a) On-site Inspection - selective
- (b) Complaints procedure - consultative commission
 - referral to General Assembly

3. Source:

Issraelyan, Victor L. and Charles C. Flowerree. Radiological Weapons Control: A Soviet and US Perspective. Occasional Paper #29. Iowa: The Stanley Foundation, February 1982.

4. Summary:

Two papers are included in this report on radiological weapons control. The first, by Flowerree, provides a general explanation of the problem. Radiological weapons use radioactive materials to cause "destruction, damage or injury on a massive scale" (p.7), and are classified as weapons of mass destruction by the United Nations. Basically, the destructive capacity of these weapons is produced through the decay of radioactive substances. Their lethality has been acknowledged in the post-war period, but they have only inspired "brief flickers of interest" as strategic nuclear weapons were deemed to be the central cause for concern.

The second paper by Issraelyan discusses some specific proposals and verification issues. Some means of verification ought to accompany a treaty restricting radiological weapons in order to guarantee its credibility and provide assurance that nations comply with its provisions. The Soviet-US draft treaty on radiological weapons is reviewed with respect to its provisions for verification of compliance. First, Issraelyan points out that there is provision for withdrawal from the treaty when a violation occurs - this will protect nations' security interests and may also deter potential violations. A consultative committee of experts is authorized to investigate and pass judgment on suspected violations, and complaints may then be addressed to the United Nations General Assembly as a last resort. "Such a complaint should include all relevant information pertaining to the case in question as well as all possible evidence supporting its validity. Furthermore, in order to ensure an effective system of verifying compliance with the treaty, each party undertakes to cooperate in carrying out any investigations which the Security Council may initiate on the basis of the complaint received" (p. 26).

C120(G84)

C120(G84)

Proposal Abstract C120(G84)

1. Arms Control Problem:

Other weapons of mass destruction - radiological weapons

2. Verification Type:

On-site inspection - selective

3. Source:

Sweden. "Proposals for parts of a treaty prohibiting radiological weapons and the release or dissemination of radioactive material for hostile purposes". CD/530, 3 August 1984.

See also: - Union of Soviet Socialist Republics and United States of America. "Agreed joint USSR-United States proposal on major elements of a treaty prohibiting the development, production, stockpiling, and use of radiological weapons". CD/31, 9 July 1979 (see abstract 020(G79)).

4. Summary:

This paper proposes that a treaty should prohibit the use of radioactive material for hostile purposes whether it be by using radiological weapons or by attacking nuclear facilities in such a way as to cause the release of radioactive material. Revisions to the USSR-US proposals are offered as compromise solutions which could serve as a basis for serious negotiations. Among the revisions is a proposal that states may register nuclear facilities under their jurisdiction with the Depositary. Upon receiving a request for inclusion of a facility in the register, the Depositary. Upon receiving a request for inclusion of a facility in the register, the Depositary would initiate an inspection mission in consultation with the requesting state to verify that the facility or facilities are nuclear facilities as defined in proposed Article II (b). After verification, the Depositary would include in the register details on the facilities and notify other parties of a new inclusion in the register.

C121(A62)

C121(A62)

Proposal Abstract C121(A62)

1. **Arms Control Problem:**
Conventional weapons
2. **Verification Type:**
 - (a) On-site inspection - selective
 - (b) Remote sensors - aerial
 - (c) International control organization
3. **Source:**
Etzioni, A. The Hard Way to Peace: A New Strategy. New York: Collier, 1962.
4. **Summary:**

This proposal suggests that military bases, especially if they are located in third countries should be opened to on-site inspection by any country and that an international disarmament organization conduct inspections periodically as well.

Aerial surveillance would be carried out to verify the demolition of bases.

C121.1(A68)

C121.1(A68)

Proposal Abstract C121.1(A68)

1. Arms Control Problem:

Conventional weapons - ground forces
- ships

2. Verification Type:

(a) On-site inspection - selective
(b) Remote sensors - aerial

3. Source:

Burns, Richard Dean. "Inspection of the Mandates, 1919-1941".
Pacific Historical Review 37 (November 1968): 445-462.

4. Summary:*

Verifying compliance with Japan's non-fortification pledges regarding its Pacific mandated islands was a serious problem to US officials during the interwar years. Five questions are posed by these events:

- (1) What authority did the United States or the League of Nations' Mandates Commission possess to verify these pledges?
- (2) How did the US react to the need for the development of a verification system during the interwar years?
- (3) What was the Mandates Commission's response to the rumours concerning Japanese remilitarization?
- (4) Did the Japanese actually violate their pledges? and
- (5) Would an international inspection system employing on-site inspections have successfully resolved Western apprehensions about Japanese pre-1939 activities?

It is pointed out that League's supervision of the mandated territories did not include the right of on-site inspection. Few inspection rights were granted in agreements governing the Pacific islands.

Prior to the 1930s the US attitude was that no formal provision for verification was necessary; fulfillment of obligations rested on each signatory's national honour and good faith. "Not until 1932 and 1933 did American policy shift to an emphatic and total endorsement of

* Editor's note: There is an extensive literature on the subjects of verification and compliance during the period between the World Wars. Because of time limitations only a few such articles have been included in this Compendium. While verification technology has advanced since that era, some of the historical insights relating to these issues continue to have relevance today.

international inspection; a reversal of attitude that appears to have been less an abandonment of principle than a recognition of a worsening world climate" (pp. 450-451). It reflected not a change of premise but that the US had more to gain from an inspection system after 1929. Prior to that time, the Japanese seemed to gain more.

The probings by the League's Mandates Commission of Japanese activities pose three considerations:

- (1) The inconclusive nature of the probes attests to the desirability of the Commission possessing adequate authority to verify reports of Japanese transgressions.
- (2) Since the Commission could not stop rumours of Japanese violations, its endeavors only lent credence to the accusations and heightened tensions.
- (3) These challenges to Japan's "honour" only strengthened the Japanese government's belief that they were politically motivated and designed to pry into matters of national security.

While contemporary observers and subsequent students have used these events as evidence supporting a case for international inspection, this position is based on untested assumptions, which, when examined critically, suggest that the case is not so clear cut. International inspectors visiting the islands would certainly have found airfields, harbour improvements and other activities. But they could not have determined the political intent behind these activities: whether they were commercial ventures or warlike preparations. Indeed, such inspections might easily have contributed to growing tensions because their results could be interpreted differently through "national selective perception".

Unfortunately, the Soviet Union is unwilling to permit intrusive methods, and there is a "basic disagreement on the geographic extension" of the first two measures. Thus, it is concluded that the prospects for MBFR are not good because it is highly unlikely that the Soviet Union will be willing to substantially reduce their forces or agree to the requisite verification measures.

C123(A85)

C123(A85)

Proposal Abstract C123(A85)

1. Arms Control Problem:

- (a) Conventional weapons - ground forces
- (b) Nuclear weapons - ballistic missiles
- (c) Regional arms control - Europe

2. Verification Type:

- (a) On-site inspection - selective
 - control posts
 - non-obligatory
- (b) International exchange of information
- (c) Remote sensors - aerial

3. Source:

Gellner, Charles R. "Verification Issues in Europe, Including the Attitude of the Warsaw Pact". In A Proxy for Trust: Views on the Verification Issue in Arms Control and Disarmament Negotiations, pp. 33-44. Edited by John O'Manique. Ottawa: The Norman Paterson School of International Affairs, April 1985.

4. Summary:

This essay begins by speculating on the attitudes of individual eastern bloc countries to verification and negotiations for Mutual Balanced Force Reductions (MBFR). Recent progress in MBFR is also reported, as Soviet proposals now include the principle of on-site inspection of troop reductions during and after they are carried out. Problems remain however, as this inspection is to be voluntary, and may be denied at critical junctures. More general verification problems in MBFR pertain to the secrecy of the proceedings and the difficulties inherent in counting troop levels in large areas where there are rapid or substantial fluctuations in force levels.

Various NATO proposals for the European theatre are then reviewed in the context of verification. Some similarities are noted between the 'associated measures' of MBFR and the Confidence and Security Building Conference (CDE) proposals. Both request advance notification for out-of-garrison activities, and require that outside observers be invited to such activities. They differ, however, in that CDE proposals would impose only a political obligation, and are designed solely to instill confidence. MBFR associated measures, on the other hand, would seek to impose a more stringent 'legal' obligation, and allow for more extensive measures which enhance verification capabilities. Among these are the establishment of permanent entry/exit points for the movement of troops, pre-notification for all major troop movements in the area of

reductions, the exchange of information and provisions for air and ground inspections. Finally, MBFR and CDE proposals differ in terms of their scope; the former applies to a limited geographical area with more specific provisions, while the latter is more general and is thus able to cover a broader geographical area.

Prospects for the verification of Intermediate Nuclear Force reductions (INF) are then reviewed. Monitoring is simpler in that no on-site inspection has been advocated by the US or NATO countries. In the past, it was deemed sufficient to monitor the deployment of missiles using only national technical means of verification. However, some difficulties have arisen with the deployment of more Soviet missiles and the difficulty of monitoring smaller, mobile, short-range missiles.

Two sets of provisions in the Stockholm Document relate to the verification of these measures. The first, and least directly relevant to verification, are the provisions concerning the invitation of observers to military activities. The main aim of such observation appears to be to promote contacts and build confidence; while the

secondary aim is to assist in ascertaining compliance to the notification and other provisions of the agreement. Detailed rules for treatment of observers are outlined as well as the nature of the conduct of the observations.

More directly related to verification are provisions dealing with inspection. While the parties recognize that national technical means will be used to monitor compliance with the agreement, the main verification methods outlined relate to ground and air inspections. Each party must accept (without right of refusal) a total of three inspections per year. They are obliged, however, to accept only one inspection per year from the same state.

The inspecting state designates the "specified area" for the inspection.. This must be an area where a notifiable military activity is taking place or is suspected to be taking place. Installations, or vessels to which access is normally denied or restricted are excluded from inspections; otherwise the inspectors have free access to move around or over the "specified area" within the time limit outlined below.

An inspection team is composed of 4 inspectors, which can divide into 2 groups. Inspections can be by ground, air or both. Detailed provisions for the rights of and restrictions on the inspectors are provided. Unless otherwise agreed, the inspected state provides the land vehicles and aircraft for the inspectors. Inspectors have the right to carry their own cameras, binoculars, maps, and dictaphones. Aerial and ground inspections as outlined in the agreement are limited to visual observation, unless the parties involved agree otherwise.

Replies to the request for inspection must be received within 24 hours of the request. The inspection must begin within 36 hours of the request and it terminates 48 hours after the entry of the inspectors into the "specified area".

A report is to be produced immediately after completion of the inspection by the inspecting state and transmitted to all parties to the agreement. Special provision is made to prevent allies from inspecting each other, to use up the annual inspection quota.

Text of Main Verification Related Provisions:

Compliance and Verification

(63) According to the Madrid Mandate, the confidence- and security-building measures to be agreed upon "will be provided with adequate forms of verification which correspond to their content."

(64) The participating states recognize that national technical means can play a role in monitoring compliance with agreed confidence- and security-building measures.

(65) In accordance with the provisions contained in this document each participating State has the right to conduct inspections on the territory of any other participating State within the zone of application for CSBMs.

(66) Any participating State will be allowed to address a request for inspection to another participating State on whose territory, within the zone of application for CSBMs, compliance with the agreed confidence- and security-building measures is in doubt.

- (67) No participating State will be obliged to accept on its territory within the zone of application for CSBMs, more than three inspections per calendar year.
- (68) No participating State will be obliged to accept more than one inspection per calendar year from the same participating state.
- (69) An inspection will not be counted if, due to force majeure, it cannot be carried out.
- (70) The participating State which requests an inspection will state the reasons for such a request.
- (71) The participating State which has received such a request will reply in the affirmative to the request within the agreed period of time, subject to the provisions contained in paragraphs (67) and (68).
- (72) Any possible dispute as to the validity of the reasons for a request will not prevent or delay the conduct of an inspection.
- (73) The participating State which requests an inspection will be permitted to designate for inspection on the territory of another State within the zone of application for CSBMs, a specified area. Such an area will be referred to as the "specified area." The specified area will comprise terrain where notifiable military activities are conducted or where another participating State believes a notifiable military activity is taking place. The specified area will be defined and limited by the scope and scale of notifiable military activities but will not exceed that required for any army level military activity.
- (74) In the specified area the representatives of the inspecting State accompanied by representatives of the receiving State will be permitted access, entry and unobstructed survey, except for areas or sensitive points to which access is normally denied or restricted, military and other defence installations, as well as naval vessels, military vehicles and aircraft. The number and extent of the restricted areas should be as limited as possible. Areas where notifiable military activities can take place will not be declared restricted areas, except for certain permanent or temporary military installations which, in territorial terms, should be as small as possible, and consequently those areas will not be used to prevent inspection of notifiable military activities. Restricted areas will to be employed in a way inconsistent with the agreed provisions on inspection.
- (75) Within the specified area, the forces of participating States other than the receiving State will also be subject to the inspection conducted by the inspecting State.
- (76) Inspection will be permitted on the ground, from the air, or both.
- (77) The representatives of the receiving State will accompany the inspection team, including when it is in land vehicles and on aircraft from the time of their first employment until the time they are no longer in use for the purposes of inspection.
- (78) In its request, the inspecting State will notify the receiving State of:
- (78.1) - the reasons for the request;
- (78.2) - the location of the specified area defined by geographical co-ordinates;

- (78.3) - the preferred point(s) of entry for the inspection team;
- (78.4) - mode of transport to and from the point(s) of entry and, if applicable, to and from the specified area;
- (78.5) - where in the specified area the inspection will begin;
- (78.6) - whether the inspection will be conducted from the ground, from the air, or both simultaneously;
- (78.7) - whether aerial inspection will be conducted using an airplane, a helicopter, or both;
- (78.8) - whether the inspection team will use land vehicles provided by the receiving State or, if mutually agreed, its own vehicles;
- (78.9) - information for the issuance of diplomatic visas to inspectors entering the receiving State.
- (79) The reply to the request will be given in the shortest possible period of time, but within not more than 24 hours. Within 36 hours after the issuance of the request, the inspection team will be permitted to enter the territory of the receiving State.
- (80) Any request for inspection as well as the reply thereto will be communicated to all participating States without delay.
- (81) The receiving State should designate the point(s) of entry as close as possible to the specified area. The receiving State will ensure that the inspection team will be able to reach the specified area without delay from the point(s) of entry.
- (82) All participating States will facilitate the passage of the inspection teams through their territory.
- (83) Within 48 hours after the arrival of the inspection team at the specified area, the inspection will be terminated.
- (84) There will be no more than four inspectors in an inspection team. While conducting the inspection the inspection team may divide into two parts.
- (85) The inspectors and, if applicable, auxiliary personnel, will be granted during their mission the privileges and immunities in accordance with the Vienna Convention on Diplomatic Relations.
- (86) The receiving State will provide the inspection team with appropriate board and lodging in a location suitable for carrying out the inspection, and, when necessary, medical care; however, this does not exclude the use by the inspection team of its own tents and rations.
- (87) The inspection team will have use of its own maps, own photo cameras, own binoculars and own dictaphones, as well as own aeronautical charts.
- (88) The inspection team will have access to appropriate telecommunications equipment of the receiving State, including the opportunity for continuous communication between the members of an inspection team in an aircraft and those in a land vehicle employed in the inspection.
- (89) The inspecting State will specify whether aerial inspection will be conducted using an airplane, a helicopter or both. Aircraft for inspection will be chosen by mutual agreement between the inspecting and receiving States. Aircraft will be chosen which provide the inspection team a continuous view of the ground during the inspection.

(90) After the flight plan, specifying, inter alia, the inspection team's choice of flight path, speed and altitude in the specified area, has been filed with the competent air traffic control authority, the inspection aircraft will be permitted to enter the specified area without delay. Within the specified area, the inspection team will, at its request, be permitted to deviate from the approved flight plan to make specific observations provided such deviation is consistent with paragraph (74) as well as flight safety and air traffic requirements. Directions to the crew will be given through a representative of the receiving State on board the aircraft involved in the inspection.

(91) One member of the inspection team will be permitted, if such a request is made, at any time to observe data on navigational equipment of the aircraft and to have access to maps and charts used by the flight crew for the purpose of determining the exact location of the aircraft during the inspection flight.

(92) Aerial and ground inspectors may return to the specified area as often as desired within the 48-hour inspection period.

(93) The receiving State will provide for inspection purposes land vehicles with cross-country capability. Whenever mutually agreed, taking into account the specific geography relating to the area to be inspected, the inspecting State will be permitted to use its own vehicles.

(94) If land vehicles or aircraft are provided by the inspecting State, there will be one accompanying driver for each land vehicle, or accompanying aircraft crew.

(95) The inspecting State will prepare a report of its inspection and will provide a copy of that report to all participating States without delay.

(96) The inspection expenses will be incurred by the receiving State except when the inspecting State used its own aircraft and/or land vehicles. The travel expenses to and from the point(s) of entry will be borne by the inspecting State.

(97) Diplomatic channels will be used for communications concerning compliance and verification.

(98) Each participating State will be entitled to obtain timely clarification from any other participating State concerning the application of agreed confidence- and security-building measures. Communications in this context will, if appropriate, be transmitted to all other participating States.

Annex IV CHAIRMAN'S STATEMENT

It is understood that the participating States recall that they have the right to belong or not to belong to international organizations, to be or not to be a party to bilateral or multilateral treaties including the right to be or not to be a party to treaties of alliance; they also have the right of neutrality. In this context, they will not take advantage of these rights to circumvent the

purposes of the system of inspection, and in particular the provision that no participating State will be obliged to accept on its territory within the zone of application for CSBMs, more than three inspections per calendar year.

Appropriate understandings between participating States on this subject will be expressed in interpretative statements to be included in the journal of the day.

This statement will be an annex to the Document of the Stockholm Conference and will be published with it.





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